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186. New *Phytol. [London] 17:*
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297. U. S. Dept. Agric. [Washington, D. C.] Bull. 729. *10 p.*
298. U. S. Dept. Agric. [Washington, D. C.] Farmers Bull. 938. —— *p.*
299. U. S. Forest Serv. [Washington, D. C.] Bull. 700. —— *p.*
300. U. S. Geol. Surv. [Washington, D. C.] Prof. Paper 101. —— *p.*
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Vol. I SEPTEMBER, 1918 No. 1

BOTANICAL EDUCATION

C. STUART GAGER, *Editor*

1. **Dahl, J. L.,** Hints for collecting botanical and zoological material. School Sci. Math. **18:** 52–53. Ja., 1918.—Material should be obtained from neighborhood: dry fruits, seeds for testing viability, twigs, wood and bark, fleshy fruits, stages of development of apple fruit, and rare specimens in formalin.—GAGER.

2. **Gager, C. Stuart,** The near future of botany in America. Address of the vice-president and chairman of Section G, Amer. Assoc. Adv. Sci., Pittsburgh, December, 1917. Science N. S. **47:** 1–14. 1. F., 1918.—Discusses the national need for botanical research on pure as well as applied science, especially in genetics, physiology, ecology, and pathology; also additional facilities for technical and popular botanical publication and promotion of study of botany in high schools and colleges; exploration, sanitation, agriculture and horticulture, food, fiber and drug supplies, forestry and conservation.—GAGER.

3. **Lunell, J.** The collecting, drying and mounting of specimens. Amer. Midland Nat. **5:** 191–195. Ja., 1918.

4. **Monsch, Genevieve,** How school gardens tend to direct a natural course in botany. School Sci. Math. **18:** 36–42, 124–129. Ja.–F., 1918.—This course grew out of garden work. No textbook used; seed catalogs and garden guides were in constant use. Foundation of course was work out of doors. First lesson was on annuals, biennials and perennials. Work continued for ten weeks. Morphology of flowers, first in many textbooks, was taken up last. Constant intelligent questions proved success of method.—GAGER.

5. **Ragland, Fannie,** A study of shade trees for Grades Seven and Eight. Nat. Study Rev. **14:** 110–120. Mr., 1918.

6. **Vinal, W. G.,** Some mechanical aids in nature study. Nat. Study Rev. **14,** 60–73. F., 1918. Contains list of plants for various conditions; clear key to trees in winter.—GAGER.

7. **Waggoner, H. D.,** The fundamental relation of botany to scientific agriculture. School Sci. Math. **18:** 11–15. Ja., 1918.—A strong sentiment exists against the old type of botany. The science of alfalfa and corn is just as good as that of the orchid and alga. Botany should be more closely correlated with agriculture. The teacher of botany should have sympathy for and knowledge of present day agriculture.—GAGER.

ECOLOGY

H. C. Cowles, *Editor*

8. **Gravatt, C. F., and G. B. Posey.** Gipsy-moth larvae as agents in the dissemination of the white-pine blister-rust. Jour. Agric. Research **12**: 459–462. 1918.—The larvae of the gipsy moth hatch and are scattered by wind during the period of spore production of the white pine blister rust. The larvae feed abundantly on the spores, and their bodies in such cases are covered with numerous spores. Gipsy moth larvae feed freely on leaves of *Ribes*, and since it has been shown that these larvae may be blown as far as twenty miles, the authors conclude that they may be important carriers of infection.—H. C. Cowles.

9. **Harper, Roland M.,** The plant population of northern lower Michigan and its environment. Bull. Torr. Bot. Club **45**: 23–42. *3 fig.* 1918.—From observations made in the vicinity of the Biological Station of the University of Michigan, at Douglas Lake, and from notes taken from car windows, has been compiled a somewhat quantitative estimate of the plant population of the northern part of the lower peninsula of Michigan. The geology, topography and climate as well as the vegetation are briefly described and a bibliography of much of the earlier literature relating to the plant life of this region is given.—Geo. D. Fuller.

10. **Roper, Ida M.,** Spartina and coast erosion. Kew Bull. Miscellaneous Information (No. 1) 1918: 26–31. *1 map.* 1918.—Attention is called to the effectiveness of *Spartina Townsendi* in establishing itself in the soft mud of tidal flats, and to the extent that shore erosion is checked when such flats are thickly carpeted with this grass. Four years ago plantings of Spartina were made between the estuaries of the rivers Kenn and Yeo in North Somerset, England, where the severe tidal currents of the Severn have been very destructive. Already the plants have spread extensively and they bid fair to carpet the ground somewhat thoroughly.—H. C. Cowles.

11.. **Waller, A. E.,** Crop centers of the United States. Jour. Amer. Soc. Agron. **10**: 49–83. *12 figs.* 1918.—"The crop centers of the United States agree with the biotic centers." For example, "the corn and winter wheat belts correspond to the deciduous central forest and the prairie climaxes, the tame hay and pasture region to the northeastern evergreen forest," and "the cotton belt to the southeasten evergreen forest. The rainfall-evaporation ratio map is useful for the demarcation of these centers, because in it are included four factors of climate, namely, relative humidity, temperature of the evaporating surface, and wind velocity as the divisor, and precipitation as the dividend.—"A fundamental difference between crop plants and the natural vegetation is seen when plants are found beyond their usual centers. The crops are found on the best soils only, since that is their sole chance to compete with other crops for profit. Plant invaders of the indigenous vegetation migrating from their centers can offer competition in the poorest habitats only. In the better habitats the plants belonging to the center are little influenced by invaders. In the extreme cases, climatic as well as soil modifications are practiced. Field plants are then grown on a comparatively large scale under glass or cloth shelter. The domesticated animals are grouped about the centers of production of those crops upon which they are most dependent. The methods used in studying plant succession have been used here. It is in this field of research that an accurate interpretation of conditions as consequences of the operation of physical forces of the past and present has been made. Migration, including invasion and competition, the latter implying dominance, are the direct results of interaction of climate and soils upon vegetation."—H. C. Cowles.

12. **Watson, Russell,** Relation of stimuli to the cone production of western hemlock. Jour. Forestry **16**: 168–175. 1918.—If the vegetative activities of thrifty western hemlock trees are suddenly checked by injuries, the tree usually is stimulated to reproductive activity. Factors which commonly stimulate the tree thus are injuries by fire and insects, mechanical abrasions, wind-throwing, decapitation, and girdling."—H. C. Cowles.

13. **Weir, Jas. R.,** Notes on the altitudinal range of forest fungi. Mycologia **10**: 4–14. 1918.—Investigations of the occurrence of forest fungi in the higher mountains of Washington,

Oregon, Idaho and Montana leads to conclusion that, while a few species are strictly alpine in habitat, the majority of forest tree fungi have a wide altitudinal range being most abundant in the lower forested areas and decreasing very greatly as the upper limits of the timbered zones are reached. Temperature and variations in moisture conditions may greatly influence the form and color of the aerial parts of fungi occurring at higher altitudes, without changing their development within the substratum or affecting the vitality of the spores. Structural features of alpine woody plants, such as cutinization, thicker epidermis and denser wood, offer greater resistance to infection. A table is given of the highest known occurrence of each of over 80 species of forest tree fungi together with host and locality where the observaton was made.—GEO. D. FULLER.

GENETICS

GEO. H. SHULL, *Editor*

14. **Bregger, T.,** Linkage in maize: The *C* aleurone factor and waxy endosperm. Amer. Nat, **52**: 57–61, Ja., 1918.—Reference is made to investigations of Collins (Amer. Nat. **46**: 569–590, 1912) demonstrating linkage between waxy endosperm and aleurone color of maize. Author's data, derived from F_1 plants heterozygous for waxy endosperm and a single aleurone color factor, back-crossed to double recessives, showed average percentage of crossing over of 26.7. A single back cross of an unrelated F_1 indicated independent inheritance, cross-over percentage 49.3. Colorless-seeded plants from pedigrees showing linkage gave colored seeds when crossed with colorless aleurone testers *a C R* and *A C r* and colorless seeds when crossed with tester *A c R*, thus indicating that *C c* is aleurone-factor pair concerned in linkage with waxy endosperm. Similar tests of plants of non-linkage cultures showed that neither *C c* nor *R r* was concerned.—R. A. EMERSON.

15. **Cockerell, T. D. A.,** A new hybrid sunflower. Torreya18: 11–14, Ja., 1918.—F_1. generation of cross of *Helianthus annus* × *petiolaris* is described. Special interest in this cross lies in fact that certain other forms, namely, *H. aridus* and *H. petiolaris* var. *patens* have been suspected of being hybrids of above-named parents. Published descriptions, however, are so different from that of present hybrid that author is led to observe that "this hybrid is obviously not *aridus* or *patens*." Article includes brief historical discussion of several species of sunflower.—L. H. SMITH.

16. **Collins, G. N.,** Tropical varieties of maize. Jour. Heredity **9**: 147–154. Ap., 1918.—Several types of maize possessing adaptive characteristics are noted and illustrated. Among these characters are single, long primary root, and mesocotyl capable of unusual elongation, of Hopi maize, adapting it to deep planting practiced by Indians of plains of Arizona and New Mexico; hairiness, surface rooting habit, and ability to grow at relatively low temperatures, of *Zea hirta*, adaptations to cool climate and light summer showers of high tablelands of Mexico; ability to withstand high temperatures, of another Mexican type; waxy endosperm and ability to withstand hot winds at flowering time, of a Chinese maize; the characteristic of remaining green long after maturity, of a Bolivian type; and the well protected ears of a maize from Guatemala. Suggests that, while none of these types is suited to wide commercial culture, they possess characteristics that might well be combined with valuable characteristics of common commercial varieties. As illustration of practicability of thus combining characters of diverse types, author cites cross of sweet corn, having poorly protected ears and therefore seriously injured by ear worms, with southern field corn, having ears well protected by long, thick husks, which resulted in production of sweet corn of good quality with well protected ears. Urges that survey of maize types be made and exchange of varieties between maize producing countries be effected.—R. A. EMERSON.

17. **Collins, G. N.,** New-place effect in maize. Jour. Agr. Res. **12**: 231–243. F., 1918.—Comparison of yields of locally grown and introduced pure-bred and hybrid seed of *Zea mais*. Controlled experiments, made with strains known to be identical, in Maryland, Kansas, Texas and Arizona, indicate that seed grown in another locality gives higher yields. Author con-

siders results due to physiological new-place effect. Since new-place effect in maize acts as stimulus it would tend to obscure any lack of adaptation in newly introduced varieties. Thus existence of new-place effect increases rather than decreases importance to be attached to local adaptation. While new-place effect must be considered as factor in production, this should not be used as argument in favor of general transfer of seed. No evidence that importance of using acclimatized seed has been over-estimated.—J. A. HARRIS.

18. **Cook, J. Glenn,** Unusual variation in crook-neck squash. Jour. Heredity **9:** 24. Ja., 1918.—Figure illustrating diverse types of squash derived from "crook-neck" grown previous season in bed containing "scallop" and "crook-neck" squashes, with brief note of explanation. The forms varied from typical "crook-necks" to intermediate types between "scallops" and "crook-necks;" warts, typical of "crook-necks," were present on some specimens and absent on others; and color varied from white and light gray to yellow and orange.—RICHARD WELLINGTON.

19. **De Vries, Hugo,** Mutations of *Oenothera suaveolens* Desf. Genetics **3:** 1–26. Ja., 1918.—*Oenothera suaveolens,* related to *Oe. grandiflora,* produced in pure culture, mutants: (a) *apetala,* "half race", having some flowers apetalous and considerable proportion with less than typical four petals; (b) *jaculatrix,* very narrow foliage; (c) *fastigiata* narrow leaves and erect branches; (d) *lata* with 15 chromosomes; (e) *sulfurea,* pale yellow flowers; (f) *lutescens,* pale foliage. *Fastigiata, jaculatrix* and *lata* are figured. *Fastigiata, jaculatrix, lutescens* and *sulfurea* bred true when selfed; *lata* selfed, or crossed with pollen of *suaveolens,* produced about 50 per cent *suaveolens,* 25 per cent each of *lata* and *lutescens.* Breeding capacity of *apetala* not yet tested. *Suaveolens* crosses with *sulfurea,* reciprocally, produced patroclinous F_1, and with *lutescens,* matroclinous F_1. Reciprocal crosses of *Oe. suaveolens* with *biennis* L., "*biennis Chicago,*" and *syrticola,* and double reciprocals of *suaveolens* and *biennis* produced in each case uniform progeny, except that some *lutescens* appeared in *suaveolens* × *biennis. Suaveolens* with "*biennis Chicago*" gave hybrids intermediate but goneoclinic to latter species. In all other crosses reciprocal families distinctly unlike, mostly intermediate. Crossed with *Lamarckiana, suaveolens* produced intermediate hybrids plus about one-fourth *lutescens.* When *Lamarckiana* was pollen parent, green offspring were of twin types, *laeta* and *velutina,* but in reciprocal cross were uniform. No *lutescens* appeared in *Lamarckiana* mut. *lata* × *suaveolens.* Author attributes occurrence of large percentage of *lutescens* to mass mutations. —G. H. SHULL.

20. **De Vries, Hugo,** Mass mutation in *Zea mays.* Science, n.s. **47:** 465–467. 10 My., 1918.—Author cites a case of mutation in maize, known as *Zea mays sterilis,* considered similar to mass mutation noted by Bartlett in *Oenothera Reynoldsii* and *Oe. pratincola.* Sterile plants devoid of branches, ears, ramifications of spike, and male flowers, appeared first in seventh generation of highly self-fertilized cultures, constituting 12 per cent of culture. Intermediate forms with incompletely developed ears and spikes also seen. One of latter yielded 19 per cent of sterile plants in eighth generation. Suggests sexual cells of fifth generation mutated to unbranched type and combined with normal gamete to produce intermediate, half mutant, in sixth generation, producing 12 per cent sterile mutants in seventh generation. Mass mutation considered important principle but known instances mostly retrogressive mutations. Reference made to apparent mass mutation in *Ranunculus arvensis, Linaria vulgaris, Papaver Rhœas, Scrophularianodosa, Clarkia pulchella.*—R. A. EMERSON.

21. **Dexter, John S.,** Inheritance in Orthoptera. Amer. Nat. **52:** 61–64. Ja., 1918.—Brief review and criticism of work of Nabours on Parattetix. Nabours recognizes some fourteen color patterns as allelomorphic to each other and one "allelomorphic only to its absence." One of the fourteen while generally allelomorphic to the others is not always so. Author points out that Nabours's evidence indicates that the fourteen characters are determined by genes in one chromosome and that at least one of these is incompletely linked with the others. Character that is "allelomorphic to its absence" is simply first known character of another linkage group belonging to another chromosome. Cites similar situation in Drosophila few years ago, as illustration.—N. R. STOLL.

22. **Fernald M. L.,** American variations of Epilobium section Chamaenerion. Rhodora 20: 1–10. Ja., 1918.—Fernald recognizes following variants of *Epilobium* (*Chamaenerion*) *angustifolium:* (1) forma *albiflorum*, petals and sepals white; (2) forma *spectabile*, petals white, sepals red, (3) var. *macrophyllum*, leaves much broader than in type, secondary veins prominent, inflorescence leafy-bracted, lower bracts broad; (4) var. *intermedium*, plants low, leaves and inflorescence much shorter than in type; (5) var. *platyphyllum*, leaves bluntish or merely acutish. Data is given indicating definite geographical ranges for these variants. Second part of paper is largely discussion of Forsaith's and Jeffrey's claims that *Epilobium angustifolium* witbin range of its ally *E. latifolium* crosses with it producing hybrids distinguished from *angustifolium* by presence of much defective pollen. Fernald contrasts those characters of the two species which might be expected to be represented in hybrids, either modified or in recombinations, and which have not been described by Forsaith for the assumed hybrids. Forsaith's citations and map of distribution are sharply criticized as inaccurate and it is pointed out that supposed hybrids were frequently from stations from 100 to 1000 miles away from nearest colony of one of assumed parents.—Bradley M. Davis.

23. **Goldschmidt, Richard,** A preliminary report on some genetic experiments concerning evolution. Amer. Nat. 52:28–50. Ja., 1918.—Author concludes that multiple allelomorphs are different quantities of an active substance, perhaps enzyme. Conception is based in part upon experiments with gypsy moth, of which there are number of geographical races. Referring only to larval pattern, races differ in amount of pigmentation which encroaches upon light pattern common to all. In general, F_1 intermediate between races crossed, F_2 gives 3 light + medium to 1 dark, and back crosses a ratio of 1 to 1. Pigment factors in all races are allelomorphic to each other.

Races of gypsy moth also differ in pigmentation of successive instars of larva. Some are light in all stages, others develop varying degrees of deeper pigmentation in later stages. F_1 between constant light race and constant darker race is intermediate or lighter at first, but becomes dark later. These races likewise differ in rate of differentiation and number of moults, and degree of pigmentation is function of time of development. By prolonging larval stage through starvation, depth of pigment characteristic of fourth instar may sometimes be attained in third instar. When mosaic larvae, having two sides of body unequally pigmented, appear in shifting race, deepening of pigment in successive stages is about equally rapid on the two sides. Such larvae produce normal moths, and their offspring are normal.

These facts show multiple allelomorphs to be different quantities of active substance, producing effects in proportion to their quantity. Former work indicated that sex in this moth is in like manner dependent upon quantitative differences in sex factors, nearly balanced quantities resulting in intersexes.

Quantitative somatic factors owe their variations either to the medium, or to fluctuation of genes. If to latter selection of extremes is effective. Castle's selection experiments with hooded rats held to be in accord with results from gyspy moth. Geographical races, beginnings of species, owe origin to these quantitative differences in genes. Natural selection may aid in their establishment, even when visible character has no selection value. Thus, in *Lymantria monacha*, dark forms have replaced white ones, not because of pigment, but because they are stronger and better fliers. Replacement has occurred in recent decades probably because of industrial development, deforestation, and war on insect pests, against which weaker white forms could not maintain themselves. Races of gypsy moth are believed to be adapted to different climates, not because of pigment, but because of differences in relative duration of larval and pupal stages. Evolutionary conclusions unsafe, however, without genetic tests, for two somatic characters apparently precisely alike may be physiologically quite unlike. Thus, *Callimorpha dominula* exhibits in Germany yellow sport like yellow Italian race. Chemically these yellows may be identical, but moths behave very differently in crosses.

Quantitative theory of genes held to obviate difficulties attending explanation of temperature-aberrations in Lepidoptera, mimicry, and improvement of breeds under domestication.—A. F. Shull.

24. **Gortner, R. A.,** *The anthocyanin pigments of plants. Science n. s. 47: 418–419. 2 Apr., 1918.—Review of book of same title by Muriel Wheldale. (Cambridge University Press Cambridge, England, 1916.) Second part of book relates to "Anthocyan and genetics." Reviewer finds work thoroughly done, and author "extremely conservative" about formulating hypotheses, and making no attempt "to further any pet hypothesis."—G. H. Shull.*

25. **Halsted, Byron D.,** Colors in vegetable fruits. Jour. Heredity 9: 18–23. Ja., 1918.—In tomatoes skin is either transparent or contains orange pigment, while flesh is either lemon yellow or pink-purple. Four possible combinations of two kinds of skin and two colors of flesh give rise to four colors of fruit: lemon, orange, pink and red. Color of skin and of flesh behave in simple Mendelian manner, orange skin being dominant to colorless, and pink-purple flesh to lemon-yellow. Some modifications of skin color are due to environmental factors, to thickness and smoothness of skin, and to hairiness.

In eggplants intensity of purple color varies in fruits of different varieties. Two classes of purple differ with respect to influence of sun, one developing without exposure to sun (as under the calyx), and other requiring exposure. In contrast to purple varieties, are white and green varieties having colorless skin. Difference between white and green varieties is due to color of flesh. *Purple skin is dominant to colorless, and green flesh to white. Striped* variety gave fruits slightly striped in F_1 from crosses with white varieties, and with purple-fruited varieties gave purple fruits in F_1. Variety "Long White" crossed with dwarf purple gave purple fruits in F_1 and purple, pink, green and white fruits in F_2.

In peppers skin is always colorless, while flesh is usually either red or orange. Orange is recessive to red. In variations of color which appear as fruit ripens, light green is recessive to dark green and changes to yellow, and various other colors are recessive to simple change from green to red.—C. F. Noll.

26. **Halsted, Byron D.,** Reciprocal breeding in tomatoes. Jour. Heredity 9: 169–173. Ap., 1918.—Discussion of characters of 120 plants of second generation from reciprocal crosses between varieties Dandy Dwarf (drawf plants with yellow foliage, coarse leaves, and red fruits) and Yellow Cherry (standard plants with green foliage, fine leaves, and yellow fruits). In number of instances, characters of respective crosses considered separately, differ widely from theoretical Mendelian ratio but totals from both crosses closely approach it. Besides four character pairs noted above, data are presented on relation of type of plant to weight, length and width of fruit; relation of color of foliage to weight, length and width of fruit; *relation of type of foliage to weight, length and width of fruit; relation of color of fruit to* weight, length and width of fruit. Author concludes that, for Mendelian characteristics, *seed parent in both combinations shows more potent influence over offspring than does pol*len parent. But with characters of fruit, weight and size, requiring averages for expression *of results, evidence points to greater influence of pollen parent.*—C. E. Myers.

27. **Hansen, Albert A.,** Petalization in the Japanese quince. Jour. Heredity 9: 15–17. Ja., 1918.—Illustrates intergradations of stamens and petals in *Cydonia japonica.*—J. A. Harris.

28. **Harris, J. Arthur,** The interrelationship of the number of stamens and pistils in the flower of Ficaria. Biol. Bull. 34: 7–17. Ja., 1918.—Statistical treatment of data published by Ludwig, Lee, McLeod, Weldon, and Pearson. Coefficient of variation for pistils is larger than for stamens. Tables of correlation between number of stamens and pistils, regression equations, and diagrams are given. Author concludes that, as total number of sporophylls increases, pistils are relatively more numerous than stamens. He deduces this by means of a formula, developed in an earlier paper, giving correlation between total number of sporophylls in a flower and deviation of number of pistils and stamens from their probable number. According to his results these correlations are of equal magnitude, but opposite in sign and negative for stamens.—Helene M. Boas.

29. **Harris, J. Arthur, and B. T. Avery,** Correlations of morphological variations in the seedling of *Phaseolus vulgaris.* Bull. Torrey Bot. Club 45: 109–119. Mr., 1918.—Many thou-

sands of individual seedling bean plants were examined with reference to certain morphological abnormalities connected with development of first three nodes. These observations had to do with placement of cotyledons, number of cotyledons, number of primordial leaves, fasciation-like structure of internode above primordial leaves, division of axis in this same internode, number of leaves at third node, number of leaflets in third node leaves, and lobing in third node leaves. Frequencies of these abnormalities are tabulated in such manner as to show their correlations with one another. It appears that abnormalities connected with upper node and upper internode tend to increase according to amount of abnormality displayed at earlier stages of development of seedling.—L. H. SMITH.

30. **Harris, J. Arthur, and A. F. Blakeslee, in cooperation with Wm. F. Kirkpatrick,** The correlation between egg production during various periods of the year in the domestic fowl. Genetics 3: 27–72. Ja., 1918.— Analysis of data from annual egg-laying contests of White Leghorn fowl at the Connecticut Agricultural Experiment Station, 1913–14, and 1914–15. Correlations of monthly egg records with total number of eggs laid during the year, and with number laid during the remaining eleven months for purpose of determining selection value of records for each single month. Correlations of monthly with annual egg production range from 0.37 and 0.38 in November and April to 1.49 in February and 0.69 in September. Correlation of each month with the total for the remaining 11 months is less, but positive and statistically significant for every month, ranging from 0.24 to 0.57. Regression lines are nearly linear and in close agreement for the two years. Separation of flock on basis of egg-laying performance and elimination of poor layers in early months result in material increase in average annual egg production.

Correlations between individual months tend to become smaller as intervals between them becomes greater, but antagonistic to this principle is fact that correlation between autumn and winter months at beginning and at end of year tends to be greater than correlation of these months with intervening spring and summer months.

Influence of monthly egg production upon total annual egg production differs greatly in the several months, being greater in autumn and winter months than in spring and summer months.—G. H. SHULL.

31. **Hawkes, Mrs. Onera A. Merritt,** Studies in inheritance in the hybrid *Philosamia* (*Attacus*) *ricini* (Boisd.) ♂ *Philosamia cynthia* (Drury) ♀. Jour. Genetics 7: 135–154. F., 1918.—Larva of *P. cynthia* has seven complete longitudinal series of black spots, while five of these are entirely lacking in *P. ricini*, and remaining two are generally partially present, though variable. For sake of convenience, author calls former condition "spotted" (S), latter "plain" (P). All of 149 F_1 larvae resulting from this cross had spots on upper part of body; most had full complement of spots characteristic of *cynthia* and were therefore spotted (S), but some had only portion of these spots and were called "reduced spots" (RS). This state of affairs is referred to in summary as "incomplete dominance" in spite of fact that dominant homozygous and heterozygous forms could be distinguished only by breeding, both being either fully or partially spotted.

Twelve matings of moths of F_1 generation, produced F_2 families which consisted of S, RS and P types of larvae in proportions 3 ($R + RS$) to 1 P. Every variety of mating was made to test whether S and RS have different hereditary values, but gave no indication of any difference. In F_6, however, one family appeared, consisting entirely of S larvae. Author expresses belief that full spots are due to series of unit characters, linked to one another rather more closely than to other characters. No further support is given for this hypothesis. No families produced only RS forms. On other hand, 20 matings of plain to plain produced only plain larvae. P form is consequently regarded as simple recessive.

Another character dealt with was presence of abnormal tubercles on bodies of certain caterpillars in F_2. There were 47 abnormal individuals in about 900 F_2 larvae. Tubercles (normally long) were either entirely absent, very short or varying in length on various segments of body. Author was unable to mate two moths arising from these abnormal caterpillars, but normal was mated with abnormal. All offspring were normal, but in next generation (F_2 of this cross) "larvae occurred with long, with short, and with no tubercles,—an

obvious Mendelian segregation." Owing to unfavorable conditions, author was not able to determine adequately genetic behavior of this character.—F. B. SUMNER.

32. **Horsfeld, F. H.,** Longevity in lily pollen. Jour. Heredity 9: 90. F., 1918.—Pollen of early-blooming lilies, saved in envelopes, mostly effective after two or three months. Pollen of late-blooming *L. auratum*, wrapped in paraffin paper and kept in warm, dry place over winter, proved viable following spring on *Lilium martagon*, but later on other lilies gave no results. Author believes pollen potent only when first exposed to air and that if original lot from *L. auratum* had been preserved in separate envelope, and contents of each used as soon as opened, he would have been more successful.—J. P. KELLY.

33. **Hunt, Harrison R., and Sewall Wright,** Pigmentation in guinea-pig hair. Jour. Heredity 9: 178-181. Ap., 1918.—Attempt to correlate inheritance of coat color with form and distribution of diffuse and granular pigment in hair structure. Black and sepia hair contain black granules in cortex and medulla, usually more dense near tips. Red hair has yellowish granules in medulla, but few granules in cortex, which shows diffuse yellow. Yellow hair is dilute red, due to fewer granules and less diffuse pigment, but contains also some small black granules. Cream hair has very few granules, apparently black, but sections show no diffuse yellow pigment although authors suppose it probably present. Authors conclude that constitution of cortex imposes some obstacle to production of red pigment granules, but enzy for black overcomes this obstacle. Dilution factors likewise reduce black pigment but little, while red considerably. "Thus it seems plausible that there is some characteristic peculiarity of cortex of guinea-pig hair which diminished quantity of cortical granular pigment in much the same way as dilution factors reduce total granular pigment contents."—J. A. DETLEFSEN.

34. **Jeffrey, E. C.,** Evolution by hybridization. Jour. Heredity 9: 25-28. Ja., 1918.—Review of "Evolution by means of hybridization," by J. P. Lotsy (The Hague, Martinus Nijhoff, 1916). Lotsy explains hereditary variations as result of hybridization. Defines species as group of like individuals breeding true from seed, genetically pure when back-crossed. Shows speeies may be derived from self-fertilized or freely crossing heterozygotes which makes for apparent uniformity of progeny. Holds all groups in period of greatest luxuriance are heterozygous, and surviving forms are degenerate homozygous species. Equiseta are example. Reviewer believes facts of morphology and phylogeny show reverse of Lotsy's conclusion to be true for Equiseta and other cryptogams. Holds that many groups of Angiospems are plexus of hybrids rather than pure species. Therefore cannot depend upon experimental results alone, but must consider facts of morphology and phylogeny if we would arrive at truth.—WILBER BROTHERTON, JR.

35. **Kearney, T. H.,** A plant industry based upon mutation. Jour. Heredity 9: 51-61. F., 1918.—In 1899 U. S. Dept. Agric. introduced into this country principal varieties of Egyptian cotton, a superior long staple cotton which originated obscurely (doubtless by hybridization) in Egypt about 75 years ago. All varieties introduced were variable, field conditions in Egypt having favored unlimited cross-pollination, and were so unfruitful and late in ripening that selection was begun at Yuma, Arizona, in 1903, in "Mit Afifi," the variety then most extensively grown in Egypt. Gradual improvement resulted for several years. In 1908 sudden change occurred: two progeny rows differed strikingly from parents and from each other, giving rise to varieties "Yuma" and "Somerton," the first of which became basis of Egyptian cotton industry in Arizona; begun in 1912, 30,000 acres in 1917, and probably 100,000 acres in 1918. Variety "Pima," arising later from "Yuma," though commercially grown, has, by line breeding and coöperation of farmers in isolation of seed increase fields, been kept unif rm while "Yuma," because of free crossing, is variable. Indications of mutational origin of varieties developed in Arizona are: each derived from single plant which appeared suddenly, and in several characters differed conspicuously from parent stock; intermediate forms not observed; progenies remained uniform so long as cross-pollination with other forms was prevented. Origin by mutation seems fairly well established in numerous varieties arising in Egypt, though records are less complete. Though mutation in Egyptian cotton has been observed only in heterozygous stocks ("Pima," line-bred, has produced none) such extreme mutants as "Yuma" and "Pima" can scarcely be explained on recombination hypothesis; the

mutant characters are not found in any stock with which parents might have been crossed, and intermediates between parent type and mutant are absent or extremely rare.—FRIEDA COBB.

36. **Lippincott, William A.,** The case of the blue Andalusian. Amer. Nat. **52**: 95–115. F.–Mr., 1918.—Author reviews data relative to blue Andalusian fowls. When mate *inter se* these produce blacks, blues and splashed individuals in ratio 1:2:1. Black and splashed mated together always produce blues. Bateson and Punnett's explanation, that blues are expression of heterozygous condition of single pair of allelomorphs, usually accepted. Goldschmidt has suggested interaction of two pairs of allelomorphic factors: (*Q*) (a quantitative pigment factor) and *M* (a mosaic factor), to account for monohybrid ratio, complete linkage assumed, so that nothing is gained over assumption of single pair of factors.

Author has studied distribution of pigment granules in feathers of the three kinds of birds. In blacks, pigment is in form of rods, which almost completely fill cell. Pigment particles are found in all parts of feather barbules including the hooklets. In blues predominating shape of pigment granules is round. Only very rarely elliptical or rod-shaped granules occur. Further, in typical blues pigment is not found in extremities of either curved or hooked barbules. Hooklets also entirely devoid of pigment. Pigmented feathers from splashed individuals show exactly same pigment arrangement and granule shape as in blues.

On this basis, author proposes another bifactorial hypothesis, factors being *R* which restricts size of pigment granule and determines its arrangement within cell, and *E* responsible for extension of pigment to all feathers of body. Genetic constitution of black is *Er Er*, blue-splashed, *eR eR*, blue *Er eR*.

To account for results so far described for these matings, necessary to assume complete linkage, but author points out that if crossing-over should occur occasionally and crossover gametes *ER* and *er* were produced in equal number matings with ordinary blues would still give 1:2:1 ratio. Individuals arising from these crossover gametes could be detected only by careful genetic analysis. In the rather meager data so far published such individuals might well escape attention. Author points out kinds of matings necessary to discover any of crossover types if they occur.

A small amount of data is given relative to crosses between blue Andalusians and White Wyandottes. F_1 offspring here all blue owing to presence of extension factor *E*. Promises further data from matings now in progress.—F. M. SURFACE.

37. **Love, H. H., and W. T. Craig,** Small grain investigations. Jour. Heredity **9**: 67–76. F., 1918.—Largely exposition of plant breeding work in small grains at Cornell University Considerable increase in yield was obtained (shown by three-year average) by isolating pure lines from commercial varieties. Not possible to change type of oats in few years by selecting parent plants within pure line. Variation and correlation studies with oats and wheat were made, first, to determine amount and nature of variation and correlation and, second, to study effect of environment on their constants. Conclusions are: (1) conditions which result in reduced yield also result in reduced height, number of kernels, and number of culms, but in increased size of kernels; (2) low yield is produced by decrease in number of kernels rather than by decrease in their size; (3) variability decreases with decrease in means; and (4) correlations are more or less responsive to enviromental conditions. In crosses between "Sixty Day" oat and *Avena fatua*, yellow color of former exhibited production of well developed awns and pubescence on glumes. One type of *fatua*, when crossed with "White Tartar King," gave 15 pubescent to 1 non-pubescent plant in F_2 while another type gave 3 to 1 ratio in F_2. Two forms of black oats classed as same variety, gave white glumes in F_2 in ratio 15 black to 1 non-black. Naked oats crossed with hulled showed that nakedness behaved as simple monohybrid but the intermediates gave all gradations of naked condition. Fully awned was recessive to weak-awned and presence of ligule was represented by one and two factors in different sorts. Authors found evidence of linkage in oats. Red color of wheat kernels is represented in different sorts by one, two or more factors. Two successful wheat-rye crosses were made. Illustrations give idea of field technique as practiced at Cornell University, also appearance of several F_1 crosses and their parents.—R. J. GARBER.

38. **Metz, Charles W.**, The linkage of eight sex-linked characters in *Drosophila virilis*. Genetics 3: 107–134. Mr., 1918.—Describes following eight mutant characters and their linkage relations: yellow (body color), frayed (bands on abdomen), vesiculated (wings), magenta (eye color), hairy (eye surface), forked (bristles), glazed (eye surface), rugose (eye surface). Six of these are figured. Linkage relations indicate that these factors form linear series in order of succession above indicated, except that frayed may possibly be to left of yellow and glazed and rugose may be allelomorphic to each other. This series is in all essentials like sex-linked series of *D. ampelophila*. Single, double and triple crossing over occur. Cross-over values vary slightly in the several experiments, but agree generally as to order of succession. No mutant factors are found in Y chromosome and no crossing over between X and Y. Yellow and forked resemble characters of same name in *D. ampelophila*, and linkage relations of these characters are approximately same in both species. There are 82 units between known extremes of sex-linked series in *D. virilis* as compared with 62.6 units in *D. ampelophila*, indicating either greater length of sex-chromosome in former species, or greater frequency of crossing over per unit of actual chromosome length. Author believes latter to be true.—G. H. Shull.

39. **Morgan, T. H.**, Inheritance of number of feathers of the fantail pigeon. Amer. Nat. 52: 5–27. Ja., 1918.—Fantail pigeons, having from 28 to 38 tail feathers, crossed to ordinary race, having 12 tail feathers. Forty-one F_1 birds ranged from 12 to 20, with modal number 14 F_2 (278 birds) ranged from 12 to 26, with mode at 14 to 15; much larger proportion of them were 12-feathered than in F_1. F_1 backcrossed to fantail gave 23 birds, ranging from 14 to 31. Three pairs of genes are enough to account for results. Data are presented indicating that one or more of genes for number of tail feathers is linked to gene for presence of oil gland, and to gene influencing color of tail feathers. Double feathers were observed, and study of them indicates that they probably arose from single rudiments that became split, rather than from separate ones that became fused. Castration of male pigeon produeed no apparent effect on his plumage.—A. H. Sturtevant.

40. **[Popenoe, Paul]**, Meaning of genetic terms. Jour. Heredity 9: 91–94. F., 1918.—Glossary of some sixty terms used in modern genetical and eugenical literature.—J. L. Collins.

41. **[Popenoe, Paul]**, Budding incompatible cottons. Jour. Heredity 9: 181. Ap., 1918.—Many attempts to secure fertile crosses between American upland cotton, *Gossypium hirsutum*, and two Asiatic species, *G. herbaceum* and *G. indicum*, have all been unsuccessful. In many instances hybrid bolls appear to set and later drop as if due to some chemical incompatibility in development. To overcome this, Mr. Meade grafted the two varieties reciprocally, thus hoping that stock would exert such chemical influence on cion that development of hybrid boll would be carried to completeness. Cions flowered so late, however, that no flowers were open on stock plants. That cotton stock may chemically influence cion is shown by results of budding dark-green-leaved cotton on stock having dark red foliage and stems. Branch growing from bud cion developed some red color typical of stock. This change in color was more noticeable on first leaves of cion and less as branch grew older.—J. L. Collins.

42. **Robbins, Rainard B.**, Applications of mathematics to breeding problems. II. Genetics 3: 73–92. Ja., 1918.—Derives formulae for determining numerical relations of alternative types of offspring from monohybrid unit-character crosses after any number of generations under given methods of breeding. Part I gives formulae for sex-linked character, under random mating, assortative mating, brother and sister mating, and parent by offspring mating. Part II deals with independent (Mendelian) character when half of offspring are bred to one parent and half to other, and when offspring are bred to younger parent.—G. H. Shull.

43. **Root, F. M.**, Inheritance in the asexual reproduction of *Centropyxis aculeata*. Genetics 3: 174–207. Mr., 1918.—This lobose rhizopod; like Difflugia, is favorable for study of inheritance in clonal lines because no growth or other changes take place in spine-bearing shell

after its formation. Numerous distinct races occur. Author started with 50 individual lines, of which 20 died in first month and remaining 30 lines were apparently all diverse. Followed only 4 lines further. Parent-offspring correlations within populations showed high correlation with respect to spine number (0.806), shell size (0.903) and mouth size (0.732), and low with respect to shell form (0.107) and mouth form (0.142). Grandparental correlation values were a little smaller.

Results within single clone ("line 30") of 749 individuals are similar and indicate that diversities in size of shell, size of mouth and number of spines are decidedly inherited, while diversities in form of shell and of mouth are only slightly inherited. Correlation between shell size and spine number is practically zero. Selections for high and low spine number gave in most cases progressive effect. but in one case whole effect resulted from first selection, after which no progress was made. Author attributes inconsistency of results in different experiments to difference of correlation in different strains between external appearance and genotypic constitution. Disapproves tendency to call all inheritable variations, mutations, and would restrict that term to variations which are fairly large. For lesser heritable variations author suggests "genetic fluctuations" or "micro-mutations."—G. H. SHULL.

44. **Schmidt, Johs.,** Racial studies in fishes. I. Statistical investigations with *Zoarces viviparus* L. Jour. Genetics 7: 105–118. F., 1918.—Statistical and experimental investigations upon viviparous blenny have been conducted by author since 1914. Only statistical results presented in this paper. Over 25,000 specimens were examined with particular reference to (1) number of vertebrae; (2) number of rays in right pectoral fin; (3) number of hard rays in dorsal fin; (4) number of pigment spots in dorsal fin. First varied from 101 to 126; second, from 16 to 22; third, from 0 to 17; fourth, from 7 to 21. No difference was detected between sexes in respect to these characters and most characters exhibited high degree of constancy from year to year.

If *A*, *B*, *C* represent high values for number of vertebrae, hard rays and pigment spots, respectively, and *a*, *b*, *c* low values, six out of eight possible combinations *ABC*, *ABc*, etc. occurred in eighty populations analyzed. Dividing total geographic area considered, into four sections, each is in general characterized by particular combination of mean values. Despite many discrepancies in geographic distribution of mean values, rule seems to hold that average number of vertebrae, of hard rays and pigment spots, are essentially lower in fjoids than outside, even at points few miles apart.

While Zoarces is thus split up into numerous local races, all eel populations of Europe are identical. Author accounts for this on ground that former spends whole life in same very restricted area,—which is very far from true of eel.

Viviparous habit of Zoarces made possible individual offspring analyses. In respect to vertebrae, number in various offspring samples can exhibit considerable variation among themselves, and differ greatly from average for population. Individual offspring analyses showed that smallest unit hitherto considered, the local "race," may be resolved into still smaller elements, expressed by means of offspring samples. These smaller elements may differ widely from one another, but when added together reproduce picture of race itself. Average values characterizing "race" are primarily dependent upon quantitative proportion between genotypes,—only secondarily on environment.

No direct correlation was found between number of vertebrae and salinity of medium; thus does not support hypothesis that racial characters are determined exclusively by environment. On other hand very distinct gradation of average qualities found in fjord populations suggests that surroundings may be of importance, either directly or indirectly, but factors coming into play not yet determine. Paper is illustrated by one plate and abundant graphs in text.—F. B. SUMNER.

45. **Shamel, A. D.,** A dry blood-orange strain. Jour. Heredity 9: 174–177. Ap., 1918.—Study of bud variation in commercial orchard of "Ruby Blood" variety of common sweet orange, *Citrus sinensis*, a variety notable for its striking bud variations. Near top of a typical tree large limb was found having narrower and more lanceolate leaves and different habit from that characteristic of trees of this variety. Fruits borne on this limb appeared nor-

mal outwardly but when opened were straw-colored instead of deep blood, had thick rind and contained no juice whatever. Further search showed that this kind of bud sport was not uncommon and in some cases entire trees of this character were found. Occasionally typical blood oranges were found on the sporting branches. Oranges of this kind are not only worthless commercially but dangerous to reputation of growers of "Ruby Blood" oranges. Elimination is being practiced.—J. L. COLLINS.

46. **Shamel, A. D.,** Striking orange bud variations. Jour. Heredity 9: 189–191. *2 pl.* Ap., 1918.—Tree of "Thompson strain," which originated by bud variation from Washington Navel orange has for eight years produced bud variations. Selection from fruit-bearing bud wood has resulted in isolation of three strains, "Washington," "Corrugated and "Thompson. Economically these three strains have very different values. Bud variation is considered frequent in Citrus varieties, and emphasis is laid on necessity of great care in selection of bud wood and of individual performance records.—J. A. HARRIS.

47. **Shamel, A. D.,** Some variable ears of dent corn. Jour. Heredity 9: 29–32. Ja., 1918. —A number of unusual maize variations, including several "freak" forms of ears and one stalk abnormality are noted and illustrated. Suggests that such variations may be of importance to geneticists and urges that any unusual forms of maize be sent to investigators in U. S. Dept. Agric., universities or other institutions.—R. A. EMERSON.

48. **Shamel, A. D.,** Chrysanthemum varieties. Jour. Heredity 9: 81–84. F., 1918.—List of thirty-nine parent varieties of chrysanthemums with new variety derived from each through bud variation, together with published authority for each variation. Gives brief history of chrysanthemum culture from 1688, when already found in Dutch gardens, to 1899 when there were 8800 varieties in Europe, with probably some duplication in names. Flowers of somewhat different color at opening from that shown later may often account for some supposedly different varieties. Obviously only those relatively constant under changed cultural conditions can be regarded as true bud variations. Only bud variations affecting bloom usually attract attention, but variations in vegetative parts are common. Variegated varieties are examples of bud variation in vegetative parts. Bud variation may be so complete that flower falls in another class, as carmine anemone from reflexed carmine, incurved white from reflexed white, and striped from solid color. Some varieties have not been known to produce bud variations. Some propagate true for periods of years and then bud variations occur, while other varieties apparently produce variations any season. Instances of different-colored flowers borne on same plant, different-colored petals in same flower, and variations in leaf shape and arrangement, which occurred at Riverside, California, in 1917, are mentioned.—A. C. ARNY.

49. **Terao, H.,** Maternal inheritance in the soy bean. Amer. Nat. 52: 51–56. Ja., 1918. Crosses involving green and yellow cotyledon color showed maternal inheritance only. green cotyledon and seed-coat ♀ × ♂ yellow cotyledon and seed-coat showed maternal inheritance of seed-coat color; reciprocal cross gave Mendelian segregation, green dominant. Explanation based on assumption of two kinds of chlorophyll, one "Y" turning yellow at maturity, other "G" remaining green. Characteristics of chlorophyll due to heritable traits of chromatophores or cytoplasm. Seed-coat color due to pair of Mendelian factors, *H* prevents seed-coat becoming yellow when beans have yellow cotyledons "Y;" *h* permits change from green to yellow. *H h* have no effect in presence of green chlorophyll "G," seed-coats remaining green with both *H* and *h*.—VIGGO LUND.

50. **Tupper, W. W., and H. H. Bartlett,** The relation of mutational characters to cell size. Genetics 3: 93–106. Ja., 1918.—Summarizes cases of mutation in relation to accompanying changes in cell size. Gives measurements of epidermal cells of calyx, petals and filaments, and diameter of body of pollen grains, and number of germination pits, in *Oenothera pratincola* and two of its mutations, *latifolia* and *gigas*. Concludes that half-dwarf habit of mut. *latifolia* is not due to smaller cells, but to fewer cells. Cells of mut. *gigas* are larger than in parent, but number of cells is fewer, resulting in less proportionate increase in size of organs than in size of cells. Increase of cell size results in decrease of metabolic activity. Not all

gigas mutations are alike, some being half-dwarf. Such half-dwarfs may be at same time cell giants. Change in cell size is not same in all organs or parts and it is not possible to determine *which characters are directly and which only indirectly due to doubling of chromosomes.*—G. H. Shull.

51. **Valleau, W. D.,** Sterility in the strawberry. Jour. Agric. Res., **12:** 613-670. Mr., 1918.—Study of flowers of strawberry, which show correlation between flower position, floral part number, and size of fruit; also between flower position and fertility of pistils. Species, progenitors of cultivated strawberry, largely diecious with variability of staminate and pistillate parts. Sterility by pollen abortion, not incompatibility of normally-developed gametes, considered to be various expressions of tendency toward dieciousness and not result of hybridization. *Sterility of later flowers of inflorescence more general in hermaphrodites* than in pistillates suggests former have been derived from staminates of diecious wild forms. Parthenogenesis does not occur. Two cases of fleshy receptacle developed without stimulus of fertilized embryos. Aborted pollen in wild *Fragaria virginiana* and *F. americana* rare; common in cultivated varieties. Percentage of aborted grains not constant in individual flowers of a variety or in individual anthers of a single flower. Pollen degeneration occurring after tetrad stage, at the time of rapid increase in cell size, considered to be due to differential ability of new chromosome combinations giving selective elimination of gametes.—D. F. Jones.

52. **Whiting, P. W.,** Inheritance of coat-color in cats. Jour. Exp. Zoöl. **25:** 539–569. Ap., 1918.—Author presents new data bearing on all familiar color variations of cats. Results are in harmony with earlier work indicating that maltese and cream dilution is unit recessive to intensity, black recessive to tabby, and yellow a sex-linked variation from black or tabby, the heterozygous color being as a rule tortoise shell. He found cases, however, in which heterozygous females were nearly self black, and, on other hand, a case in which yellow female bred consistently as if heterozygous. Whiting finds that self white variation is simple dominant over color. He finds no simple mode of inheritance for blue eyes and deafness, often associated with self white, but suggests that white spotting factors may produce these effects when present in self white. White spotting proved highly irregular in inheritance. Author gives most interesting analysis of tabby pattern. Ticking of individual hairs with yellow is dominant over black, variations in width of ticking being due perhaps to multiple allelomorphs. Another feature of tabby pattern, however, stripping of coat as a whole, is not determined by this factor, but merely revealed more clearly by it. In the stripes, there is alternate strengthening and weakening of black as opposed to yellow, revealed clearly in presence of factor for ticking, and also alternate intensity and dilution of color, seen best in yellow cats. The stripes are interpreted as due to waves of general metabolic activity. Spots are due to interference of longitudinal and transverse waves. Three segregating types of striping were found, very narrow or lined (epistatic to others), medium or tiger, and very wide or blotched. Evidence favors hypothesis of three allelomorphs but does not eliminate possibility *that two sets of factors may be involved. In conclusion there is an interesting discussion of* the probable origin of colors of cats and relation of these to different types of coat patterns in wild Felidae.—Sewall Wright.

53. **Whiting, P. W.,** Sex-determination and biology of a parasitic wasp, *Hadrobracon brevicornis* (Wesmael). Biol. Bull. **34:** 250–256. Ap., 1918.—Virgin females produce only males, mated females usually produce both sexes. Author concludes that fertilized eggs produce females. Male has haploid number of chromosomes. First spermatocyte division is abortive. Habits of insect, and variation in color pattern and sex ratio are described.—A. F. Shull.

54. **Wright, Sewall,** Color inheritance in mammals. VIII. Swine. Jour. Heredity **9:** 33–38. Ja., 1918.—Review of fragmentary observations and experiments, with attempt to put these disconnected data into logical scheme. White coat of Yorkshire and Chester red of Tamworth and Duroc Jersey, black with white points and occasional white splashes of Berkshire and Poland-China, belt of Hampshire and belted reds, wild coat of *Sus scrofa,* and

black of Hampshire and Essex, are tentatively explained by two independent allelomorphic pairs, *Dd* and *Vv* and set of triple allelomorphs, E_y, E_v, and E_h. Minor factors are assumed for intensity of red and restriction of black in red breeds, and minor factors for intensity of black and restriction of red in black breeds with white points. While suggestive, author points out more convincing data are necessary.—J. A. DETLEFSEN.

55. **Wright, Sewall,** Color inheritance in mammals. IX. The Dog. Jour. Heredity **9**: 87–90. F., 1918.—Different colors and color patterns of the dog are discussed. Attempt is made to explain variations in colors and color patterns according to scheme given in Jour. Heredity **8**: 373 (August, 1917). Black-eyed whites are probably comparable to black-eyed white mice and guinea-pigs. There are other whites due to dilution factor. Brown is recessive to black. Much more work is necessary before relations of many colors are solved.—E. ROBERTS.

56. **Wright, Sewall,** Color inheritance in mammals. X. The Cat. Jour. Heredity **9**: 139–144. Mr., 1918.—Summarizes work which has been done on inheritance of color in cats. Solid white seems to be due to dominant factor. Dilution in maltese is due to simple recessive character, but inheritance of dilution in Siamese cat is not known. Tortoiseshell orange and pattern of common tabby cat are discussed. Scheme used in previous papers of this series on color inheritance in mammals, for explaining colors and color patterns, is employed in his paper.—E. ROBERTS.

HORTICULTURE

W. H. CHANDLER, *Editor*

57. **Brooks, Charles, and J. S. Cooley,** Effect of temperature aeration and humidity on Jonathan-spot and scald of apples in storage. Jour. Agric. Res. **11**: 287–317. Pl. 32, 33. Nov. 12, 1917.—Covers experiments carried on in 1915–16, to determine factors influencing the development of Jonathan spot and apple scald. The two diseases are reported to be alike in the tissues affected, they have similar temperature responses and are similarly affected by aeration and humidity and by the maturity of the fruit. These similarities are great enough to suggest some close relationship in the fundamental causes of the two diseases. Both diseases were decreased by good aeration and by a fair degree of maturity and hoth were increased with a rise in temperature, the optimum being about 20° and the maximum about 30°C.

On Grimes and York Imperials apple scald developed in moist chambers at 0°, 5°, 10°, 15°, and 20°C. The rapidity of development increased with higher temperatures. In open containers no scald developed at any of the above temperatures except at 0°C. Apples stored in an atmosphere containing probably more than 5 per cent of carbon dioxide did not develop typical scald but developed a pungent alcoholic taste and finally broke down. The writers express the opinion that apple scald is largely due to abnormal conditions resulting from poor aeration. The occurrence of scald was accompanied by a decrease in total acids nd sugars.

The rate of skin color development in Grimes apples was increased by a rise in temperature and it was checked by poor aeration and apparently but little affected by relative humidity. Scald was found more serious on green fruit than on ripe fruit but developed more rapidly on the latter. Delay in storage of immature fruit delayed and lessened the development of apple scald. It is pointed out that the effect of delayed storage depends largely upon the initial maturity of the fruit and the degree of aeration during the delay. Aeration appears to play a very important part in prevention of apple scald. This fact seems to furnish an explanation for the small amount of this disease usually found in cellars and air-cooled storages.—LAURENZ GREEN.

58. **Brooks, Charles, and Fisher, D. F.,** Irrigation experiments on apple-spot diseases. Jour. Agric. Res. **12**: 109–137. *Pl. 5.* Jan. 21, 1918.—Deals with the effects of soil-water

supply upon bitter-pit, Jonathan spot and certain other nonparasitic spot diseases of the apple. It also includes notes upon the effect of maturity upon the development of these apple spot diseases in storage. These apple spots are not due to fungi or bacteria. They have been frequently found on unsprayed fruit, thus making the theory that spray materials are responsible for the trouble seem untenable.

The work reported was carried on at Wenatchee, Washington, where very little precipitation occurs from April to October, making the trees entirely dependent upon irrigation for their soil-water supply during the growing season. The amount of spotting was determined at picking-time and notes were taken to determine the increase in spotting in storage. The amount of internal discoloration was determined at the close of the storage period. These experiments included observations on fruits from trees which had received heavy, medium and light irrigation, and medium irrigation until August and then heavy irrigation the rest of the season. Heavy irrigation followed by light irrigation, alternating irrigations between heavy, medium and heavy and between heavy, medium, heavy and medium. The experimental data also include observations on the influence of size and growth upon spotting.

The early stages of Jonathan spot are confined to the color-bearing cells of the skin of the apple. Heavy irrigation greatly increased the disease but not so much as medium followed by heavy irrigation. Light irrigation greatly reduced the trouble but heavy followed by light irrigation resulted in the lowest percentage of the disease. Sudden changes in the amount of soil-water apparently did not increase the disease. Large apples showed greater susceptibility to bitter-pit than did small ones, but with Jonathan apples heavy irrigation had more influence on the disease than did the size of the fruit. With Grimes apples heavy irrigation seemed to increase the trouble on small apples more than on the larger ones. Apparently large apples are affected because of certain conditions under which they become large rather than merely because they are large. Early picked, immature fruit seem to show a greater susceptibility to Jonathan spot than later picked, more mature fruit. Bitter-pit on Jonathan apples was worse on fruits that were picked early than on those that were picked late.—Laurenz Green.

59. **Ridley, V. W.,** Factors in transportation of strawberries from the Ozark region, U. S. Dept. Agric., Bureau of Markets, Market Documents No. 8, M. 25, 1918—Resuts obtained are applicable to all strawberry-producing sections. The investigation included comparisons of prompt cooling, delayed cooling, precooling in transit, the effectiveness of false floors as an aid in refrigeration, a study of temperatures in transit and the manner of loading for best refrigeration. Careful picking and handling and prompt and thorough cooling was found necessary to reduce losses from decay in transit. The use of salt in the ice bunkers immediately after loading and again at the first re-icing, about twelve hours later, were found effective in hastening the rate of cooling in the car. About 2.5 per cent of the ice capacity of the bunkers at the first application and 1 per cent at the second application of salt is advised when the fruit is at a higher temperature than 60. If at a lower temperature less salt may be used. Loading crates higher than four layers in the car was found to decrease the keeping quality of the fruit and higher loading is not recommended. A new system of bracing in the center of the car is described, using wedges instead of long braces. This was found efficient, and gave an equal loading capacity without piling the crates so high.—Laurenz Green.

MORPHOLOGY

E. W. Sinnott, *Editor*

60. **Allard, H. A.,** Abnormalities in Nicotiana. Bot. Gaz. 65: 175–185. 1918.—Various types of synanthy are described for a species of Nicotiana (presumably *N. alata* Link and Otto). In *N. Tabacum* catacorolla was found to be a common abnormality in plants affected with the mosaic disease. In such cases this abnormality is not inherited and is apparently due to external conditions. Other species of Nicotiana rarely show it in connection with the mosaic disease. Instances of two growing points and of an abnormal number of corolla lobes are also recorded.—E. W. Sinnott.

61. **Arber, Agnes,** Further notes on intrafascicular cambium in Monocotyledons. Ann. Bot. 32: 87–89. 1918.—A summary of the cases of intrafascicular cambium which have been reported shows that this feature occurs in all but two of Engler's cohorts of Monocotyledons. A list of fourteen families is furnished. It is stated that the feature shows best in young stems at a very short distance from the growing apex, also sometimes in young leaves.—M. A. Chrysler.

62. **Bower, F. O.,** Studies in the phylogeny of the Filicales. VII. The Pteroideae. Ann. Bot. 32: 1–68. 1918.—This paper is a continuation of the author's series on the phylogeny of the Filicales, and takes up the perplexing group of the Pterideae and their allies. Within the Pterideae of Prantl there are probably two distinct lines, the "Pterideae bi-indusiatae" (Pterid series), and the "Pterideae uni-indusiatae" (Cheilanthoid series). This paper is concerned chiefly with the former, and discusses the stelar structures and soral characters of Lindsaya, Paesia, Pteridium, Lonchitis, Histiopteris, Anopteris, Pteris, Acrostichum, and Saccoloma, drawing conclusions as to their phyletic positions. Either the outer or the inner indusium may be abortive in this series. Several members of the Dicksonioideæ were also studied and steps in the abortion of the inner indusium were found. This fern series is believed to have sprung from some Schizaeoid source and to be related to the Pterid series as a collateral branch. It is noted that the point of origin of the sorus is apparently not always an absolutely constant character, since the ferns studied, though belonging to the Marginales, frequently show analogies with the Superficiales, due to a slide of the marginal sorus to a superficial position. The Superficiales, however, are believed to be ferns in which this slide took place so early in descent that the group is clearly distinct, phyletically.—E. W. Sinnott.

63. **Braun, E. Lucy.** Regeneration of *Bryophyllum calycinum.* Bot. Gaz. 65: 191–193. 1918.—The author records an instance in *Bryophyllum calycinum* where leaves attached to the plant produced shoots and roots plentifully from their notches. In many leaves almost all the notches produced shoots. Neither of these occurrences has been noted in the studies of Loeb on this species.—E. W. Sinnott.

64. **Cribbs, J. E.,** A columella in *Marchantia polymorpha.* Bot. Gaz. 65: 91–96. *Pls. I, II.* 1918.—A columella-like structure was observed in specimens of the sporophytes of *Marchantia polymorpha.* This "columella" consists of a dense cluster of elaters in the mid-region of the capsule, and extends from its base for about two-thirds of its length. The sporogenous cells accompanying the young elaters became completely disorganized. Author compares this columella to the elaterophore of Pellia. The disorganization of the sporogenous cells, however, suggests a pathological condition; but author thinks peculiarities noted are not due to external factors.—The development of the normal young sporophyte was studied, and excellent figures are given. The latter agree closely with those of Meyer in his recent work on the Marchantiales (1916, Russian). Meyer figures the cap of sterile cells noted by the author and this has also been noted in a number of other Marchantiales; e.g., Plagiochasma, Wiesnerella, Dumortiera.—D. H. Campbell.

65. **Douglas, Gertrude E.,** The development of some exogenous species of agarics. Amer. Jour. Bot. 5: 36–54. *7 pl.* 1918.—Since the gill development of agarics with a gill cavity has been quite thoroughly cleared up by Atkinson and others, the author has studied the following seven species which lack the universal veil; *Mycena subalcalina* Atkinson, *Hygrophorus miniatus* Fr., *H. nitidus* B. & C., *H. borealis* Pk., *Entoloma flavifolium* Pk., *E. grayanum* Pk., and *E. cuspidatum* Pk. Aside from certain minor variations in the differentiation and development of stipe, pileus and gills, the early development in these seven species is the same. The gills arise at the stem, on the exposed under surface of the rudimentary pileus and extend centrifugally until the margin of the cap is reached. "Except for the fact that these gills develop on the exposed under surface of the pileus and not within a gill cavity, their method of origin is the same as that of the endogenous forms of the Agaricus type recently studied."—F. A. McAllister.

66. **Fitzpatrick, H. M.,** Sexuality in *Rhizina undulata* Fries. Bot. Gaz. **65**: 201-226. 1918.—*Rhizina undulata* is said to be parasitic on conifers, the cause of a root disease. The material for this investigation was found in pine woods at Ithaca, N. Y., where the fungus was found to form a white, mold-like growth enveloping the roots. Young fruits appear first as little white knobs of mycelium. When they attain a size of about 1 mm. in diameter, the archicarps make their first appearance, 3-8 in each ascocarp. Very shortly after, black spines grow out from deep-seated sterile tissue. All the cells of the ascocarp were found to be multinucleate from the first. The archicarps are loosely coiled or undulating threads, transformed from ordinary multicellular hyphae in the center of the ascocarp. They consist of from ten to nineteen cells each, multinucleate throughout, the nuclei increasing greatly in number by repeated divisions. Terminal cell of each archicarp is attenuated and at maturity its contents are disorganized. The author suggests that if it be a trichogyne it is no longer functional. There are no antheridia. When the archicarps are mature contiguous cells become continuous by the organization of a central pore in each septum. The nuclei migrate to the middle cells of the archicarp. From these middle cells (about half the total number) the ascogenous hyphae grow out. The nuclei in these hyphae are paired, but no conjugate divisions were observed. No nuclear fusions were seen in the archicarp and the author is of the opinion that a double nuclear fusion in the life history of none of the Ascomycetes has so far been demonstrated. The asci in Rhizina originate from croziers and into each young ascus there enters a pair of nuclei which very soon fuse. The cytology of the ascus was not investigated. In reviewing the conflicting views regarding the phenomena of sexuality in the Ascomycetes, the author points out that "the questions involved in the study of the nuclear history of the Ascomycetes will never be satisfactorily answered by *a priori* argument," a weakness which he considers characterizes a good deal of the work of the past.—J. H. FAULL.

67. **Hodgson, Robert W.,** An account of the mode of foliar abscission in Citrus. Univ. California Publ. Bot. **6**: 417-428. *3 figs.* 1918.—This paper, on the shedding of the young leaves of the "Washington Navel" orange, *Citrus sinensis*, and of the "Eureka" lemon, *Citrus Limonum*, covers a histological and cytological study of the abscission zone and separating layer prior to and during the process of abscission as distinguished from exfoliation. Citrus was studied because of its economic importance and because few data are available on abscission in thick walled tissues. The plants were greenhouse grown. The behaviour of the two species was similar. Abscission was induced by placing cuttings in a moist chamber, at room temperature, for 24-96 hours. The temperature and age of the material were important factors. The introduction of illuminating gas and CO_2 of varying concentrations did not materially alter the results.

The abscission zone, of 10-18 cell layers with the separation layer at the upper end, arises at or near the base of an internode, abscission occurring at the base of the terminal leaflet roughly opposite the grooved ring and also at the base of the petiole 8-10 cells distal to the grooved ring. Ring years no definite relation to location of abscission zone. Zone is preformed and ready to function upon proper stimulation. In young material there are no visible histological differences delimiting the zone. In older material the zone cells are smaller, isodiametric, and have denser contents than those adjoining. Abscission involves the separation of the cells along the middle lamella, but no cell divisions or elongations of the tertiary membranes were observed. All tissues across the petiole except the tracheae and the cuticle function in separation. Before abscission much starch is present in the zone cells, but this is largely withdrawn or used. After separation the cells continue growth and division and use any residue present. The first stage of the cell separation consists in a marked swelling and gelatinization, not only of the middle lamellae but of the entire walls with the exception of the tertiary membranes. Secondly, a dissolution of the gelatinized walls by hydrolysis occurs. There is little evidence that turgor plays any considerable rôle as a causal agent in the separation.—ELOISE GERRY.

68. **Loeb, Jacques,** Chemical basis of correlation. I. Production of equal masses of shoots by equal masses of sister leaves in *Bryophyllum calycinum*. Bot. Gaz. **65**: 150-174. 1918.—This paper is a continuation of the author's studies of correlation in Bryophyllum.

Equal masses of sister leaves (fresh weight) were found to produce approximately equal masses of shoots in equal time and under equal conditions. This was shown by a series of experiments comparing the weight of shoots per unit of weight of detached sister leaves from which they grew (1) when both leaves were intact, (2) when both were divided into halves, (3) when one was intact and the other cut into four or more pieces, and (4) when one was intact and the other had its center removed. The number of shoots which were allowed to develop and the size of the pieces into which a leaf was cut were found to modify but slightly the weight of shoot produced by a given leaf. From an isolated leaf suspended in moist air a large number of shoots begin to grow. The one or two which start first persist and become large, thus inhibiting the growth of the others, presumably by attacting the bulk of the food material. Evidence is presented that the amount of available water determines where the first shoots shall be produced. These two factors (the limited amount of material available for growth and the automatic attraction of the material by the buds which grow out first) are held to explain the inhibiting effect of these buds on the growth of the others. No explanation of the mechanism for this attraction is suggested.—E. W. SINNOTT.

69. **McNair, James B.,** Secretory canals of *Rhus diversiloba*. Bot. Gaz. 65: 268–273. 1918.—The intercellular resin passages of *Rhus diversiloba*, the "poison oak" of the Pacific slope, were found in the roots, stem, leaves and fruit in the phloem of the primary bundles and also in the secondary bast of the stem and root, in the phloem of the mesocarp of the fruit and in the hypocotyl and cotyledons of the embryo. Resin passages were not found in the anthers, pollen, xylem, epidermis, cork cells and trichomes, hence these parts are non-toxic. The canals originate schizogenously but a few cases were noted which indicated the possibility of lysigenous development. Tangential anastomoses of the resin ducts were noted, especially in the nodes. No essential difference in the anatomy which would explain the poisonous or non-poisonous character of the species of the Anacardiaceae was found. The fresh resinous sap emulsion of *R. diversiloba* is the only part of the plant capable of producing dermatitis. This is non-volatile but may be transported mechanically by the wind. (Other work on this point by the author is cited.) The liability of poisoning is greatest in spring, less in summer and fall and least when the plant is leafless.—ELOISE GERRY.

70. **Sax, Hally Jolivette,** Spore-formation in *Philocopra coeruleotecta*. Amer. Jour. Bot. 5: 61–78. *Pl. 9–11*. 1918.—Spore-formation in the 128-spored ascus of *Philocopra coeruleoecta* is essentially the same as in an 8-spored ascus. Beginning with the fusion nucleus in the ascus, seven successive mitotic nuclear divisions follow, and except for a decrease in size of the spindles no differences among them were noted. The author confirms Overton and others in finding that in multi-spored asci the spores originate by free-cell formation and that at first the nuclei of the young spores are beaked and adherent to the plasma membrane. The conclusion that there is little in common between a multi-spored ascus and a phycomycetous sporangium is quite in harmony with the established status of the 8-spored ascus.—J. H. FAULL.

71. **Stokey, Alma G.,** Apogamy in the Cyathaceae. Bot. Gaz. 65: 97–102. 1918.—Cases of apogamy previously reported are from families other than Cyathaceae, mostly from Polypodiaceae. A prothallium of *Dicksonia squamosa* showed no archegonia but two apogamous buds and numerous antheridia. Specimens of Cyathea presented unusual growths from the central cell of an archegonium. No conclusions could be drawn from cultural conditions as to the factors favoring apogamy.—M. A. CHRYSLER.

72. **Tenopyr, Lilian A.,** On the constancy of cell shape in leaves of varying shape. Bull. Torr. Bot. Club 45: 51–76. 1918.—In a study of the leaf cells of Linum, Lobelia, Campanula, and other forms the following conclusions are reached: The average *cell size* in a given tissue of a given variety or species is a fairly constant hereditary character, as certain other workers also have stated. Cell size depends in part upon the stage of development of the plant at the time the organ is formed; the size diminishes somewhat in a series of successively formed organs. Differences in the size of organs are due to differences in the number, not the size, of the cells. Hereditary size is therefore here dependent upon the rate and duration of cell

division.—The cells of the leaf have a characteristic length and breadth in a given species. Differences in leaf shape in the same plant or in a related species are not due to differences in *cell shape*, but to different numbers of cells along various axes. Leaf shape is therefore due to factors periodically limiting cell division in certain directions.—L. W. SHARP.

73. **Thompson, W. P.,** Independent evolution of vessels in Gnetales and Angiosperms. Bot. Gaz. **65**: 83–90. 1918.—The type of vessel believed to be highest in evolutionary scale is the so-called "porous" vessel, characterized by perforation of the end wall by a single large pore. This is found characteristically in the most advanced forms both of the Gnetales (Gnetum), and of the Angiosperms. Thompson shows that this structure has arisen in the two groups in different ways. In Gnetum the perforation has been formed by the enlargement and fusion of several irregularly placed bordered pits, and by the loss of the membranes. This is demonstrated by the nature of the vessels of the conservative regions, these being similar to those of Ephedra (the most primitive of the Gnetales), where perforation consists of the loss of membranes from otherwise nearly normal bordered pits; or of transitional nature between the two types, showing often half-formed large openings made up in part of membraneless rounded pits. Among Angiosperms the lower type of vessel is generally admitted to be that with scalariform perforations. This has arisen from the tracheid of lower forms in one of two ways: by the perforation of scalariform bordered pits of an ancient type of tracheid, or by fusion and perforation of the common circular multiseriate pits. The porous vessel has clearly been developed from the scalariform. Thus in both cases several bordered pits have become a single large perforation, but in Angiosperms a stage with narrow horizontal slits intervenes. There can be no genetical relationship between the vessels of these two groups.—Thus the vessel which has long and prominently been used as the connecting link between the highest Gymposperms and the Angiosperms can no longer be evidence for relationship between these groups, even for their origin from a common vessel-possessing ancestor. Rather, we have a good example of the attainment by two groups of plants of the same level of evolutionary development of xylem.—A. J. EAMES.

74. **Weston, W. H.** The development of Thraustotheca, a peculiar water mould. Ann. Bot. 32: 155–173. *Pl. IV, V, 2 figs.* 1918.—The author gives a more complete and detailed description of this rare and somewhat anomalous genus of Saprolegnaceae than has heretofore appeared, considerably extending and supplementing the observations of previous writers as to its morphology, development and reproduction. The account is based, for the most part, on the direct examination of living material which was grown in pure cultures, both gross and microscopic. The formation and peculiar dehiscence of the sporangia, the several types of germination of the sporangiospores, the detailed structure and development of the zoöspores, the occurrence and significance of gemmae, the development and interrelation of the sex organs, the correlation between the presence of antheridia and the formation of eggs, and the relation of the reproductive activities to the supply of nutriment, are among the more important matters considered. The author concludes that the genus is related to Achlya rather than to Dictyuchus. The paper is fully illustrated.—R. THAXTER.

75. **Whitaker, Edith S.,** Anatomy of certain goldenrods. Bot. Gaz. **65**: 250–260. 1918. —A further contribution to our knowledge of the anatomical mechanism by which the herbaceous type of stele has been derived from the woody. Miss Whitaker demonstrates the origin of the herbaceous stem in the Compositae (Solidago). The woody tissue surrounding the leaf traces near their points of departure from the stele is transformed into "storage parenchyma." Radial bands of non-woody cells thus penetrate the vascular cylinder. These are subtended by the trace itself, beginning weakly some distance below the point of exit of the trace, becoming strongly developed, and ending abruptly just above the point where the trace passes out through the band. In cross sections these bands seem to split the stele into alternate broad "rays" and fibrovascular bundles. In the more slender upper parts of the stem, the vascular ring is thinner, and the storage parenchyma is necessarily limited to the sides of the trace. Thus a stele of more nearly equal separate bundles is formed. This demonstrates for a family at the top of the dicotyledonous series the working out of the same general principles, as have already been shown for lower forms—Betulaceae, Fagaceae, and Rosaceae.

The leaf trace bundles, when in the cortex, are shown to be bicollateral. The presence of internal phloem in this very conservative region suggests the idea that the Compositae formerly possessed internal phloem in the stem, as do the Cucurbitaceae and other high dicotyledonous families.—A. J. EAMES.

PALEOBOTANY AND EVOLUTIONARY HISTORY

E. W. BERRY, *Editor*

76. **Knowlton, F. H.,** Fossil floras of the Vermejo and Raton formations of Colorado and New Mexico. U. S. Geol. Surv. Prof. Paper 101. P. 223–437. Pls. 30–103. 1918.—Economically important coal-bearing formations of palustrine origin in the Raton Mesa country of northeastern New Mexico and southeastern Colorado have long been worked. Geologists have disagreed regarding the age of these deposits. Following an extended account of the geology of the region by W. T. Lee, the fossil plants, which occur in abundance in association with the coal seams, are described by Knowlton. Two general horizons are recognized—the Vermejo formation, which is of late Upper Cretaceous age, and the Raton formation, of lower Eocene age.

The Vermejo flora comprises 108 species and includes a few doubtful fucoidal forms, an abundance of conifers, including Sequoia and Widdringtonites, a few ferns and monocotyledons, and numerous dicotyledons. Ficus and Viburnum appear to be the most diversified genera. New species are described in Asplenium?, Osmunda, Sequoia, Cupressinoxylon, Sabal, Canna?, Juglans, Myrica, Salix, Populus?, Quercus, Ficus, Artocarpus, Credneria, Laurus, Amelanchier, Phaseolites, Colutea, Celastrus, Zizyphus, Sterculia, Pterospermites, Hedera, Vitis?, Cissites, Diospyros?, Viburnum, Palaeoaster, and Phyllites. This flora is regarded as indicative of a warm, moist climate lacking marked seasonal changes.

The Raton flora comprises 148 species and includes a few Polypodiaceae, many large palms and numerous dicotyledons, particularly among the Amentiferae. New species are described in Dryopteris?, Pteris, Asplenium?, Anemia, Alismaphyllites, Sabal, Geonoma, Juglans, Populus, Fagus, Quercus, Ficus, Artocarpus, Aristolochia?, Castalia, Magnolia, Laurus, Oreodaphne, Cinnamomum, Liquidambar?, Platanus, Cercocarpus, Prunus, Sophora, Cassia, Inga, Euphorbocarpum, Rhus?, Celastrus, Acer, Sapindus, Rhamnus?, Apeibopsis?, Tilia, Sterculia, Dombeyopsis, Vitis, Cissus, Aralia, Cornus, Andromeda, Chionanthus, Apocynophyllum, Viburnum and Phyllites. The Raton flora is regarded as indicative of a moist, warm temperate climate and a prevailingly swamp environment. The report is profusely illustrated.—BERRY.

PATHOLOGY

DONALD REDDICK, *Editor*

77. **Allard, H. A.,** The mosaic disease of Phytolacca decandra. Phytopath. **8:** 51–54. *Fig. 1–2.* 1918.—The disease resembles mosaic of tobacco in general symptoms, in communicability, incubation period, etc., but the two are not intercommunicable. The infective principle survives the winter in the underground portions and appears in the new shoots. There is every reason to believe that carriers of infection at times become active but the aphides that spread the tobacco mosaic are not agents for communicating this disease.—D. REDDICK.

78. **Appleman, C. O.,** Investigations in progress. Plant Physiology. Maryland Agric. Exp. Sta. Ann. Rept. **30:** viii–ix. Ja., 1918.—Studies of the abnormal carbohydrate metabolism in potatoes affected with the spindling-sprout disease are mentioned.—J. B. S. NORTON.

79. **Bakke, Arthur L.,** Longevity of Helminthosorium teres. (Abstract.) Phytopath. **8:** 80. 1918.—Organism in pure culture in a test tube remained alive from January, 1911, until November, 1917.—D. REDDICK.

80. **Ballard, W. R.,** Investigations in progress. Pomological and small fruit investigations. Maryland Agric. Exp. Sta. Ann. Rept. **30:** x–xi. Ja., 1918.—Some vinifera type grapes grew well, others died. Mildew was very injurious to some grape varieties. Seedlings of "Clinton" crossed with tender vinifera varieties were hardy and mildew resistant. Quinces blighted severely. Blackberry varieties differ in injury from rust, double blossom and winter injury. Nutt and Ricard type of geraniums seem more disease resistant.—J. B. S. Norton.

81. **[Besley, F. W.],** Report of the Maryland State Board of Forestry for 1916–17, p. 17–24, 45, 71–86. 1918.—A tabulation of the forest fires of the State for the two years shows that 305 fires burned over 60,547 acres of timber, valued at about $110,999. Extensive investigation of the white pine plantings and nurseries for two seasons failed to reveal the blister rust in Maryland.—J. B. S. Norton.

82. **Brooks, Charles,** and **J. S. Cooley,** Air movement as a factor in the prevention of apple scald. (Abstract.) Phytopath. **8:** 69. 1918.—Apples stored at 15°C. in practically saturated atmospheres containing 1.5 to 5 per cent CO_2 scald badly where there is no air movement but have remained free when the air is kept in constant motion.—D. Reddick.

83. **Brooks, Charles,** and **D. F. Fisher.** Soft scald of apples and cherries. (Abstract.) Phytopath. **8:** 68–69. 1918.—Scald increases with an increase of CO_2 content of container or a rise in temperature. Red color of the skin fades and softening and browning of flesh follows. Mechanical injuries are centers. A film of moisture favors development of scald.—D. Reddick.

84. **Burkholder, W. H., I. M. Hawley,** and **E. W. Lindstrom.** Some results of the New York State bean investigation. Proc. New York State Fruit Growers' Assoc. (17th Ann. Meet.) **16:** 120–125. 1918.—Under the sub-title, Diseases of beans and the improvement of the crop through breeding, is discussed in a semi-popular way: dry root rot, caused by *Fusarium* sp.; Rhizoctonia root rot; black root rot, caused by *Thielavia basicola*; anthracnose and mosaic. An anthracnose-resistant white marrow bean is reported. Mosaic is most common in the field on pea and medium beans.—D. Reddick.

Butler, O., On the preservation of phytopathological specimens in their natural colors. Phytopath. **8:** 66–68. 1918.—A specimen jar of appropriate size is filled with a 1 per cent. solution of sodium bisulphite; citric acid (or other acid, preferably organic) is then added until a strong odor of sulphur dioxid is given off, then the specimen to be preserved is placed in the solution and the jar sealed. At the end of 0.5–2 hrs. (sometimes longer) the jar is opened, the bleaching solution immediately poured off, replaced once with water and then with a 4 per cent solution of formaldehyde. The specimen is to remain permanently in this solution. The bleaching solution should be allowed to act only until the color most difficult to retain begins to fade.—D. Reddick.

86. **Carpenter, C. W.,** Report of the Plant Pathologist. Rept. Hawaii Agric. Exp. Sta. **1917:** 33–42. *p. IV and V.* Ap., 1918.—The following diseases of the Irish potato have been identified in Hawaii: Late blight (*Phytophthora infestans*), wilt (*Fusarium oxysporum*), rosette and scurf (*Rhizoctonia solani*), tuber rot (*Fusarium oxysporum* and *F. radicocola*), and a new foliage disease apparently induced by a species of mite. Bordeaux mixture is demonstrated effective in controlling *Phytophthora infestans*.—The occurrence of a disease of bananas similar to the Panama wilt is noted and other banana maladies are mentioned. Other diseases identified are as follows: Bean, anthracnose, (*Colletotrichum lindemuthianum*); celery, late blight, (*Septoria petroselini* var *apii*); sweet potato, scurf (*Monilochaetes infuscans*), soft rot, (*Rhizopus* sp- and *Fusarium solani*), leaf spot (*Septoria bataticola*); tomato leaf spot, (*Septoria lycopersica*), blight, (*Phytophthora infestans*).—C. W. Carpenter.

87. **Chandler, W. H.,** Influence of low temperature on fruit growing in New York State. Proc. New York State Fruit Growers' Assoc. (17th Ann. Meet.) **16:** 186–194. 1918.

88. **Chapman, G. H.,** Mosaic disease of tobacco. Massachusetts Agric. Exp. Sta. Bull. **175:** 69–117. *Pl. I–IV.* My., 1917.—A brief review of the work of previous investigators and the results obtained by the author relating to the cause, reactions of the causal agent, and

experimentally its close parallelism to enzymatic processes. The author holds that the disease is not caused by an organism, at least in the ordinary concept of that term. It is also shown that the primary infection occurs in a majority of cases in the seed-bed. Results obtained by the excessive use of fertilizer constituents and lime apparently do not indicate any relationship to the intensity of the disease. The effect of colored light on the disease is also discussed, and, contrary to Lodewijks' results, no control was indicated, although the visible symptoms of the disease were in some cases suppressed. Specific methods for control are recommended.—P. J. ANDERSON.

89. **Coons, G. H., and F. A. Spragg,** Resistance and susceptibility of certain wheat varieties to loose smut. (Abstract.) Phytopath. 8: 60–70. 1918.—Variety "Going's" much more susceptible to *Ustilago tritici* than "Shepherd's Perfection." D. REDDICK.

90. **Corry, E. N., and P. Garman,** Investigations in progress. Maryland Agric. Exp. Sta. Ann. Rept. 30: xiii. Ja., 1918.—Treats briefly of the relation of a mite *Tarsonemus pallidus* to leaf spots of geranium and other plants.—J. B. S. NORTON.

91. **Doolittle, S. P., and W. W. Gilbert,** Further notes on cucumber mosaic disease. (Abstract.) Phytopath. 8: 77–78. 1918.—The infective principle apparently does not overwinter in soil or seed. Striped beetles carry it, as do pickers. The disease has been communicated to 18 species in 10 genera of Cucurbitaceæ. Attempts to control the disease have not met with success.—D. REDDICK.

92. **Durrell, L. W.,** Factors influencing the uredospore germination of Puccinia coronata. (Abstract.) Phytopath. 8: 81–82. 1918.—Spores must lie in a film of water. They do not germinate in a moist atmosphere nor submerged in water, nor do they germinate in the absence of oxygen. Cardinal temperatures are: min. 0 to 2°C., opt. 18 to 22°C., max. 35°C.—D. REDDICK.

93. **Durst, C. E.,** Tomato selection for Fusarium resistance. (Abstract.) Phytopath. 8: 80. 1918.—As a result of selection, strains have been developed, from varieties possessing desirable market characteristics, which are capable of living through the season in thoroughly infested soil.—D. REDDICK.

94. **Edgerton, C. W.,** A study of wilt resistance in the seed-bed. Phytopath. 8: 5–14. *Fig. 1–4.* 1918.—Experiments with *Fusarium lycopersici* on tomato in sterilized, reinoculated soil. Seedlings of susceptible strains grown in pots go down very rapidly under such conditions and may be eliminated quickly. The method is as realiable as that of growing plants in the field. Data regarding varietal resistance to disease, virulence of various cultures of the wilt fungus, and the effect of different soils and different substances in the soil on the development of the organisms are presented.—D. REDDICK.

95. **Edgerton, C. W.,** Delayed ripening of tomatoes caused by spraying with Bordeaux mixture. (Abstract.) Phytopath. 8: 69. 1918.—Use of Bordeaux mixture delays ripening of fruit. Financially the control of *Alternaria solani* and *Cladosporium fulvum*, except in epiphytotic years, is more than offset to the market gardener by delayed ripening of fruit.—D. REDDICK.

96. **Faulwetter, R. C.,** The Alternaria leaf-spot of cotton. Phytopath. 8: 98–105. *Fig. 3.* 1918.—A species of Alternaria, perhaps *A. tenuis* Nees., is shown by experimentation to be a weak parasite on the leaves of cotton (*Gossypium* sp.). Under favorable conditions it may attack uninjured leaves but it usually follows in the lesions of *Bact. malvacearum* or injuries by red spider. The lesions are first pale green, later straw yellow and finally rusty brown. They have a brittle, papery texture and irregular, concentric-ridged zonations.—D. REDDICK.

97. **Fernald, H. T.,** White pine blister rust work. Ann. Rept. [Massachusetts] State Nur. Inspector (1917) 16: 3–9. Ja., 1918. [Also in 65th Ann. Rept. Massachusetts State Bd. of Agric..]—Summary of scouting and eradication measures during 1917 and details of plan and organization of the work. Every town in the State has been scouted for cultivated Ribes and all diseased ones (about 30,000) removed. Work was begun too late to do much with

pines. Three eradication areas, covering several towns, were established in and around which all Ribes, whether diseased or not, were destroyed. The condition in Massachusetts is considered serious. During 1916–1917 blister rust has been found on Ribes in 265 towns and on pines in 72 towns. Accompanying maps show pretty general distribution throughout the State but least in the central part.—J. P. Anderson.

98. **Fromme, F. D.,** Relative susceptibility of beans to rust. (Abstract.) Phytopath 8: 76. 1918.—Of fifty varieties of beans tested (names not given), most proved susceptible to *Uromyces appendiculatus*, while a few may be classed as rust resistant and a few as very susceptible.—D. Reddick.

99. **Galloway, Beverly T.,** Some of the broader phytopathological problems in their relation to foreign seed and plant introduction. Phytopath. 8: 87–97. 1918.—An elaboration on three lines of thought, based on the author's intimate acquaintance with the development of the U. S. Dept. Agric. and of Phytopathology in that department, as follows: (1) The work is international; no broad phytopathological problems are local. (2) Regulatory and restrictive measures must be regarded as palliative at best. (3) Plant hygiene, a systematic, organized, coördinated study of crops in their relation to environment offers the broadest field for research and applied science.—D. Reddick.

100. **Gardner, M. W.,** and **W. W. Gilbert,** Cucumber angular leaf-spot and anthracnose overwintering and seed treatment control. (Abstract.) Phytopath. 8: 79–80. 1918.

101. **Garner, W. W.,** and **D. E. Brown,** Investigations in progress. Tobacco. Maryland Agric. Exp. Sta. Ann. Rept. *30:* xix–xx. *1918.—A disease similar to the root rot was found* affecting legumes and all Maryland varieties of tobacco. Seeding of "Maryland Mammoth" tobacco was delayed on the infested soil. "Connecticut Broadleaf" is practically immune. —J. B. S. Norton.

102. **Godfrey, G. H.,** Sclerotium rolfsii on wheat. Phytopath. 8: 64–66. *Fig. 1.* 1918.—Brown lesions on the crown and lower portions of the culm accompanied by a failure to produce kernels. *S. rolfsii* isolated and pathogenicity strongly indicated as a result of inoculation experiments performed on a small scale in greenhouse.—D. Reddick.

103. **Harter, L. L.,** and **J. L. Weimer,** Storage rots of sweet potatoes. (Abstract.) Phytopath. 8: 73. 1918.—A list of twenty-five organisms that have been tested for ability to produce decay.—D. Reddick.

104. **Harter, L. L.,** and **J. L. Weimer.** A surface storage-rot of sweet potatoes. (Abstract.) Phytopath. *8:* 73. *1918.—Disease* is caused by *Fusarium hyperoxysporum* or a closely related species. Infection occurs at digging time apparently through dead or dying rootlets. Lesions develop slowly, are shallow, somewhat sunken, brownish in color and irregular in shape.—D. Reddick.

105. **Hartley, Carl,** Rhizoctonia as a needle fungus. Phytopath. 8: 62. 1918.—Notes a rare case of *Rhizoctonia* sp. occurring on needles of Douglas fir (Abies) and causing conspicuous, reddish lesions. The organism differs from *Corticium vagum* var. *solani* only in having smaller sclerotia. It is thought to be a parasite but no infection experiments were attempted. —D. Reddick.

106. **Hopkins, E. F.,** The disease of tulips caused by Botrytis parasitica. (Abstract.) Phytopath. 8: 75. 1918. The disease is widespread in U. S. A. It may be distinguished from other similar diseases by the minute pin-head-sized sclerotia of the pathogene. The organism is a restricted parasite.—D. Reddick.

107. **Jagger, Ivan C.,** Hosts of the white pickle mosaic disease of cucumber. Phytopath. 8: 32–33. 1918.—The white pickle type of mosaic was transferred to a number of speciesand numerous horticultural varieties of the family Cucurbitaceae and to *Helianthus debilis* and *Lobelia erinus* var. *gracilis*.—D. Reddick.

108. **Jagger, I. C.,** Mosaic diseases of cucurbits. (Abstract.) Phytopath. 8: 74–75. 1918.—The white-pickle type of mosaic has been transferred to a large number of species and

varieties in the family *Cucurbitaceæ* and to one species each in the families *Lobelaceæ* and *Compositae*. The mottle-leaf type has been transferred to a few species and varieties of *Cucurbitaceæ*. A third type of mosaic has been found.—D. REDDICK.

109. **Jagger, I. C., and V. B. Stewart**, Some Verticillium diseases. Phytopath. **8**: 15–19. 1918.—Cultural studies of, and cross inoculations with *Verticillium* sp. isolated from eggplant (*Solanum melongena*), *Berberis thunbergii*, salsify (*Tragopogon porrifolius*), potato (*Solanum tuberosum*) and maple (*Acer rubrum*). Organism is closely related to, but apparenty not, *V. albo-atrum* R. & B. Inoculations also made on various varieties and species of *Solanaceæ*. The cultures from eggplant, barberry, salsify and species of Solanum are indistinguishable in rate of growth, macroscopic appearance, and formation of sclerotium-like bodies. The fungus from maple differs in the rate of formation of sclerotium-like bodies.—D. REDDICK.

110. **Jagger, I. C., and V. B. Stewart.** Some Verticillim diseases. (Abstract.) Phytopath. **8**: 75. 1918.

111. **Jehle, R. A.,** Susceptibility of Zanthoxylum clava-hercules to Bacterium citri. Phytopath. **8**: 34–35. 1918.—Susceptible when organism is introduced in needle prick.—D. REDDICK.

112. **Johnson, James,** Wilt disease of tobacco attributed to Fusarium. (Abstract.) Phytopath. **8**: 76–77. 1918.—Evidence is presented for believing that the disease is caused by *Fusarium* sp. and not by bacteria, but artificial infection has not been secured.—D. REDDICK.

113. **Johnson, James, and B. E. Hartman,** Influence of soil temperature on Thielavia root-rot. (Abstract.) Phytopath. **8**: 77. 1918. Root-rot of tobacco occurs sparingly or not at all at temperatures above 23–26°C. Diseased plants transferred to a soil of this temperature or higher temperature develop new roots which are free from disease.—D. REDDICK.

114. **Jones, L. R.,** Laboratory outlines in plant pathology. Phytopath. **8**: 60–61. 1918. —Review of book by H. H. Whetzel, Lex R. Hesler, Chas. T. Gregory and W. Howard Rankin.

115. **Jones, L. R., W. W. Gilbert, and M. W. Gardner,** Lightning injury to crops. Records of observation. *(Abstract.) Phytopath.* **8**: *80. 1918.*

116. **Keitt, G. W.,** Third progress report on investigations of leaf spot of cherries and plums in Wisconsin. (Abstract.) Phytopath. **8**: 72–73. 1918.—Spraying experiments show that the disease can be controlled with Bordeaux mixture as weak as 2: 2: 50, and with lime-sulfur solution diluted 1: 40 (Arsenate of lead was used in combination). Certain proprietary sulfur preparations were not so effective. Destruction of fallen leaves before blossoms open helps reduce the amount of disease.—D. REDDICK.

117. **Kempton, F. E., and H. W. Anderson,** Quince rot. (Abstract.) Phytopath. **8**: 71. 1918.—A fungous disease, but organism not identified. The fruits are first gray, later purplish and finally brown.—D. REDDICK.

118. **Lyman, G. R.,** The relation of phytopathologists to plant disease survey work. (Abstract.) Phytopath. **8**: 78–79. 1918.

119. **Massey, L. M.,** Experiments for the control of blackspot and powdery mildew of roses. Phytopath. **8**: 20–23. 1918.—Use of bordeaux mixture, lime-sulfur solution, cupra-ammonium wash, and sulfur-lead-arsenate dust, on eight varieties, for control of these diseases (caused by *Diplocarpon rosæ* Wolf and *Sphærotheca pannosa* var. *rosæ* Wor.), in well controlled experiments in nursery row and garden. Bordeaux mixture (4: 4: 40) and sulfur-lead-arsenate dust (90: 10) proved decidedly superior for blackspot and the dust mixture much better for control of mildew.—D. REDDICK.

120. **Massey, L. M.,** Dry rot of gladiolus. (Abstract.) Phytopath. **8**: 71–72. 1918.—A fungous disease. Organism referred to genus Sclerotium. Corms become infected in field and mummify in storage. Lesions are small, more or less circular with a definite margin and of brown to brownish black color.—D. REDDICK.

121. **McClintock, J. A.**, Spinach blight. (Abstract.) Phytopath. **8**: 74. 1918.—A specific disease, which can be transferred to healthy plants.—D. Reddick.

122. **McKay, M. B.**, and **Venus W. Pool**, Field studies of Cercospora beticola. Phytopath. **8**: 119–136. *Fig. 1–2.* 1918.—*Martynia louisiana* is a new host. The organism is spread to some extent by the air, insects and irrigation water. It is killed by passage through the alimentary tract of cattle, by heating at 100°C. for 30 min. and by ensiling. In sugar beet fields primary infection may come from beet balls or débris of other hosts but chiefly from old beet top material left on the ground from the previous season. Careful removal of infected beet tops after harvest delays the appearance of the disease in non-rotated fields the following season and reduces the injury therefrom. Some American grown seed is heavily infected, lesions appearing on the cotyledons. Treatment with formaldehyde (commercial, 40 per cent) 15: 1000 for 7 min., is effective and not injurious to the seed.—D. Reddick.

123. **McCubbin, W. A.**, Dispersal distance of urediniospores of Cronartium ribicola as indicated by their rate of fall in still air. Phytopath. **8**: 35–36. *2 graph.* 1918.—Spores fell a distance of 8 feet in still air in 4–5 min. Possible distance of dispersal by wind of various velocities is calculated.—D. Reddick.

124. **Melchers, L. E.**, Botrytis sp. causing severe injury to flowers and foliage of Pelargonium hortorum. (Abstract.) Phytopath. **8**: 76. 1918.

125. **Melchers, Leo E.**, and **John H. Parker**, Three varieties of hard red winter wheat resistant to stem rust. (Abstract.) Phytopath. **8**: 79. 1918.

126. **Melhus, I. E.**, Seed treatment with hot solutions of formaldehyde and mercuric chlorid. (Abstract.) Phytopath. **8**: 81. 1918.—Solutions of formaldehyde and of mercuric chlorid, 2 pints in 30 gal. of water and 2 ounces in 15 gal. of water, respectively, held at 48 to 50°C. for 5 min., have proved fully effective for the control of common scab (Oospora) of potatoes. Oat smut was prevented by treatment for 1 min. with 1 part formaldehyde solution to 320 parts of water at temperatures of 45, 50, 55, and 60°C. Barley stripe disease was practically eliminated by treatment of seed for 5 min. at a temperature of 50°C. with formaldehyde 1: 320 or mercuric chlorid 1: 1000.—D. Reddick.

127. **Morse, Warner J.**, How to control potato enemies. Quarterly Bulletin Maine Department of Agriculture **18** : 23:40. 1918.—[Reprint of Miscellaneous Publ. 535 of the Maine Agric. Expt. Sta., March, 1918, with the same title but authorship not given.] Enumerates the principal potato diseases known to occur in the state and discusses methods of control.—W. J. Morse.

128. **Munn, M. T.**, Pathogenicity of Bacillus amylovorus (Burr.) Trev. for blossoms of the strawberry (Fragaria sp.). Phytopath. **8**: 33. 1918.—Secured infection by artificial inoculation with atomizer. Disease has not been noted in nature.—D. Reddick.

129. **Norton, J. B. S.**, Investigations in progress. Botany and plant pathology. Maryland Agric. Exp. Sta. Ann. Rept. **30**: vii–viii. Ja., 1918.—Investigations in progress on tomato blight caused by *Septoria lycopersici*; the effect of copper sulfate acting through the root on the resistance of tomatoes to the above fungus; brown rot of peaches; fusarium resistant tomatoes; and the State Plant Disease Survey, are reported. The apothecial stage of the brown rot fungus was abundant after the entire absence of peaches the previous year.—J. B. S. Norton.

130. **Orton, W. A.**, Organization and correlation of research and extension work in plant pathology. (Abstract.) Phytopath. **8**: 78. 1918.

131. **Osmun, A. Vincent**, and **W. S. Krout**, A new Sclerotium disease of lawn grasses. (Abstract.) Phytopath. **8**: 72. 1918.—The disease is primarily one of young grasses, resulting in so-called burning-out. Organism has been isolated and infection secured on *Agrostis alba, Phleum pratense, Cynosurus cristatus, Lolium perenne, Trifolium hybridum, T. pratens, T. repens, Melilotus officinalis, M. alba, Medicago sativa*, and *Vicia* sp.—D. Reddick.

132. **Potter, Alden A., and G. H. Coons.** The species of Tilletia on wheat. (Abstract.) Phytopath. **8**: 72. 1918.

133. **Potter, Alden A., and G. W. Coons.**—Differences between the species of Tilletia on wheat. Phytopath. **8**: 106–112. *Fig. 1-4.* 1918.—*Tilletia lævis* (B. & C.) Schrot. (*fœtens*) and *T. tritici* (Bjerk.) Winter are shown to be generally confused in literature, exsiccati, etc. *T. lævis* causes a shortening of the culms of from 6 to 8 cm., heads are small, more slender and open than normal, sori produced only where kernels would be produced, sori oblong, consistency of smut mass unctuous. *T. triciti* causes a shortening of the culm of about 30 cm. heads enlarged, usually all apical florets hear sori, sori elliptic to round, consistency of smut mass friable. The distribution of the two species may account for confusion in regard to certain control measures, soil infestation, destruction of threshing machines, and varietal susceptibility.—D. Reddick.

134. **Potter, Alden A., and Leo E. Melchers,** Resistance of sorghum types to covered kernel smut. (Abstract.) Phytopath. **8**: 71. 1918.—None of the commercial types of *Jorghum vulgare* is immune to *Sphacelotheca sorghi*. Milo and feterita are highly resistant, as are a number of the durras and a dwarf kaoliang variety.—D. Reddick.

135. **Ramsey, G. B.,** Influence of moisture and temperature upon infection by Spongospora subterranea. Phytopath. **8**: 29–31. 1918.—All combinations of three temperatures (60, 70, and 80° F.) and three conditions of soil moisture (dry, moist and wet) were tried. Soil infested with *S. subterranea*, "Green Mountain" potatoes used. Infection occurred only in the moist and wet cultures at the lowest temperature (five out of six pots).—D. Reddick.

136. **Reddick, Donald** [and **F. C. Stewart**], Pathological aspects of the freight-rate classification on peaches. Proc. New York Fruit Growers' Assoc. (17th Ann. Meet.) **16**: 12–19. 1918.—An essay, outlining investigations in pathology that should be made in order to form a basis for fair settlement of damage-in-transit claims. F. C. Stewart is joint author but his name was arbitrarily omitted by the editor.—D. Reddick.

137. **Reynolds, Harris A.,** White pine blister rust. Published by the Committee on tbe Suppression of the Pine Blister Russ in North America. Ja., 1918.—A compilation of reports submitted to the committee at the Pittsburgh conference in November, 1917, by those in charge of the blister rust work in the several states, a summary of the situation by H. Metcalf, a report of scientific investigation by Perley Spaulding, and resolutions of the committee. The territory west of the Mississippi river and south of Ohio and Pennsylvania is free of the disease. Only local infections occur in the central western states. In the New England states, New York and parts of Ontario, the disease is pretty generally distributed. The committee recommends continued scouting in the far west to prevent the disease entering, eradication in the middle west and experiments looking toward local control in New England.—P. J. Anderson.

138. **Roberts, John W.,** Plum blotch. (Abstract.) Phytopath. **8**: 74. 1918.—*Phyllosticta congesta* Heald & Wolf said to cause the disease. Lesions occur on fruit, leaves and probably the twigs of Japanese varieties of plums.—D. Reddick.

139. **Smith, Loren B.,** Insect transmission of spinach blight. (Abstract.) Phytopath. **8**: 74. 1918.—The disease is communicable and is transmitted by several species of insects. —D. Reddick.

140. **Stakman, E. C., and G. R. Hoerner.** Puccina gramini stritici-compacti in southern United States. (Abstract.) Phytopath. **8**: 77. 1918.

141. **Stevens, F. L.,** Some meliolicolous parasites and commensals from Porto Rico. Bot. Gaz. **65**: 227–229. *Pl. 5–6, figs. 1–5.* 1918.—See abstract under Taxonomy of Non-Vascular Cryptogams.

142. **Stewart, F. C.,** The Phoma blight of red cedar. Phytopath. **8**: 33–34. 1918.—Record of the occurrence of *Phoma* sp. on *Juniperus virginiana* in Iowa in 1896.—D. Reddick.

143. Stewart, F. C., and A. J. Mix, Blackheart and the aeration of potatoes in storage. New York [State] Agric. Exp. Sta. Bull. 436. Je., 1917.—The fundamental cause of blackheart in potatoes is a lack of oxygen sufficient for the needs of respiration. Blackheart may occur at any temperature above 45°C. provided air is partially or wholly excluded from the potatoes for a sufficient length of time. With a volume of air equal to the volume of the tubers and a temperature of 21°C. confinement of tubers in hermetically sealed jars for 10 or 12 days is sufficient to produce well-marked blackheart. At 12–16°C. about twenty days are required and at lower temperatures a still longer time. The deep piling of potatoes in storage without provision for ventilation is frequently a cause of blackheart.—F. C. Stewart.

144. Stewart, V. B., Dusting experiments in 1917. Phytopath. 8: 63–64. 1918.—Leaf spot of quince caused by *Fabræa maculata* (Lév.) Atk. and leaf-blotch of horse-chestnut, caused by *Guignardia æsculi* (Pk.) Stewart were controlled under conditions of extreme infection with dust mixture consisting of 95 parts finely ground sulfur and 5 parts powdered arsenate of lead. A mixture of 90 parts sulfur and 10 parts hydrated lime was not so satisfactory.—D. Reddick.

145. Stone, R. E., Orange rust of Rubus in Canada. Phytopath. 8: 27–29. *Fig. 1.* 1918. —Occurrence of *Gymnoconia interstitalis* (Schlect.) Lag. noted on species of Rubus in Canada, especially Ontario. Aeciospore germination figured.—D. Reddick.

146. Vaughan, R. E., and J. W. Brann, Potato seed treatment. (Abstract.) Phytopath. 8: 70. 1918.—Mercuric chlorid loses strength with successive treatments especially when tubers are dirty. Of the varieties tested "Rural New Yorker" was most resistant to *Oospora scabies*.—D. Reddick.

147. Walker, J. C., Control of neck rot and anthracnose of onion sets. (Abstract.) Phytopath. 8: 70. 1918.—Drying the stock at harvest time at 90–120°F. for 48–72 hrs. is effective —D. Reddick.

148. Walker, J. C., Notes on the resistance of onions to anthracnose. (Abstract.) Phytopath. 8: 71–72. 1918.—White onions are susceptible whereas red and yellow varieties are decidedly resistant to the anthracnose organism. Coloring matter is in solution in the cells and is easily extracted with water. Such extract inhibits spore germination. There is a close correlation between coloring matter, inhibition of germination and resistance.—D. Reddick.

149. Weir, James R., New hosts for Razoumofskya laricis. Phytopath. 8:,6–63. 1918.— New hosts are *Picea engelmanni, Abies lasiocarpa* and *Pinus albicaulis*.—D. Reddick.

150. Weir, James R., and Ernest E. Hubert, A note on Hyalosporæ. Phytopath. 8: 37–38. 1918.—Evidence to indicate that *Hyalospora polypodii* on *Wodsia scopulina* and *H. aspidiotus* on *Phegopteris dryopteris* are autoecious.—D. Reddick.

151. Weir, James R., and Ernest E. Hubert, Notes on the overwintering of forest tree rusts. Phytopath. 8: 55–59. 1918.—The data presented indicate that *Melampsora bigelowii* on *Salix* spp. *Melampsoropsis pyrolæ* on *Pyrola, Melampsoridium betulæ* on *Betula* sp., *Pucciniastrum* spp. on *Epilobium adenocaulon* and *P. pyrolae* on Pyrola, winter over by means of the uredinial stage. It is thus possible to explain the repeated occurrence of these normally heteroecious rusts in regions far removed from their alternate hosts.—D. Reddick.

152. Weir, James R., and Ernest E. Hubert, Cronartium coleosporioides on Pedicularis groenlandica. Phytopath. 8: 63. 1918.—Three genera are now listed as hosts, namely Castilleja, Orthocarpus and Pedicularis.—D. Reddick.

153. Weir, James R., and Ernest E. Hubert, Notes on forest tree rusts. Phytopath. 8: 114–118. 1918.—*Melampsorella elatina* (A. & S.) Arth. in its aecial stage causes harmful witches-brooms and a dwarfing of tips and branches. Cultural studies indicate the *Peridermium coloradense* (Dietel) A. & K. on *Picea engelmanni* is identical with *M. elatina* on *Abies lasiocarpa* and *A. grandis*, the teliospores occurring on *Stellaria borealis*. *Pinus excelsea* is a new host.—*Peridermium holwayi, P. ornamentale* and *P. columnare* are considered identical and are referred to *Calyptospora Columnaris*—Aeciospores of *Melampsora artica*

Rostr. On *Abies grandis* produced infection on *Salix scouleriana.* The aecisopores are thickened at one end. The aecial stage may occur on the same needles with *Pucciniastrum pustulatum.*—D. Reddick.

154. **Western New York Horticultural Society.** Proposed prohibition of the importation of foreign nursery stock. Proc. West. New York Hort. Soc. **63**: 115–117. 1918.—Discussion of U. S. Senate Bill No. 3344. Resolution (p. 120) adopted contains the following: "*Whereas,* there are now few diseases in Europe that have not been brought to the United States, and as only an imaginary line separates the United States from the Dominion of Canada and Mexico, from [sic, (to?)] which countries such plants and seeds may be brought; *Resolved* that the New York State Horticultural Society go on record as opposed to this bill."—D. Reddick.

155. **Whetzel, H. H.,** The Botrytis blight of golden seal. (Abstract.) Phytopath. **8**: 75–76. 1918.—The disease is destructive to cultivated *Hydrastis canadensis* only in wet seasons. All parts of the host are affected. The organism, *Botrytis* sp., winters as minutes clergotia and as dormant mycelium in the dead petioles.—D. Reddick.

156. **Whetzel, H. H.,** Latest information on fruit diseases and their control. Proc. West. New York Hort. Soc. **63**: 63–71. 1918.—Apple scab unusually severe. Average of results of growers' experiments in 11 orchards showed scab to be present as follows: untreated trees 54 per cent, sprayed trees 31.6 per cent, dusted trees 31 per cent. Black root-rot of apple, caused by species of Xylaria, is described and distribution noted. Yellow leaf of cherry (*Coccomyces* spp.) abundant but controlled by spraying or dusting. Peach brown rot (*Sclerotinia cinerea*) and scab (*Cladosporium carpophilum*) controlled by dusting. A fruit-gumming of plum, cause unknown, is described.—D. Reddick.

157. **Wilson, O. T.,** Notes upon a market disease of limes. Phytopath. **8**: 45–50. *Fig. 1–5.* 1918.—A distinctly smooth spot with sharply elevated margin is the best macroscopic character. Diseased fruit has an abnormal odor. The interior tissue is occupied by a filamentous fungus. Repeated attempts to induce sporulation resulted in failure. Dried fragments of mycelium retain vitality and surface inoculations of healthy limes result in characteristic infection.—D. Reddick.

159. **Wolf, Fredericd A.,** and **D. E. Stanford,** A Macrophoma disease of figs. Phytopath. **8**: 24–27. 1918.—Cankers on the larger limbs of *Ficus carica* in North Carolina, caused by *Macrophoma fici* Alm. & S. Cam. Pathogenicity proved by inoculation experiments.—D. Reddick.

159. **Wolf, F. A.,** Tobacco wildfire. North Carolina Agric. Extension Service Circ. 61. *4 p.* 1918.—Popular account of a tobacco leaf-spot disease reported in full in Jour. Agric. Res. **12**: 449–459. 1918.

160. **Zimm, L. A.,** A wilt disease of maples. (Abstract.) Phytopath. **8**: 80–81. 1918.—The disease is caused by a species of Verticillium but not *V. albo-atrum.* *Acer saccharum, A. rubrum* and *A. platanoides* were inoculated and typical wilt produced. The young shoots lost their leaves after several weeks and by the end of summer the twigs were dead. Mycelium was found in the tracheae of the wood and in the leaf petioles.—D. Reddick.

PHARMACOGNOSY

Henry Kraemer, *Editor*

161. **Mueller, N. R.,** The cultivation of Hyoscyamus. Jour. Amer. Pharm. Assoc. **7**: 127–8. 1918.—A discussion of the results obtained from the cultivation of henbane, grown at the Pharmaceutical Exp. Sta., Department of Pharmacy, Univ. of Wisconsin. Directions are given for the selection of proper field for the cultivation of henbane, methods of planting seed, care of the growing plants and methods for collection of the drug. Chemical assays of the leaves of the second year's growth of biennial henbane showed a total of 0.07 per cent of alkaloids, while the leaves of the first year's growth grown from the same seed gave 0.067 per

cent. It is evident from these assays that the activity of the d ug is about the same whether collected from the first or second year plant.—A. HOGSTAD, JR.

162. **Holmes, E. M.,** Note on Euonymus atropurpureus. Pharm. Jour. **100**:88. 1918.—A bark, rejected as not genuine root bark of *Euonymus atropurpureus*, consisted of about one part of genuine Euonymus bark and seven parts of a false bark. The false bark possesses numerous transverse scars, medullary rays three cells wide and large yellowish secretion cells. The transverse fracture does not show tangential striation of the liber nor the delicate gummy caoutchouc-like threads so characteristic of the true bark. Also the true bark is somewhat scaly externally, with slight longitudinal ridges and no transverse scars, and the medullary rays are but one cell wide. The false bark bears a resemblance to the bark of *Ptelea trifoliata* but the medullary ray cells of the latter bark are filled with sphaerapides, which do not occur in the medullary rays of the false Euonymus. This false bark is not identified. Criticism is made that the description of Euonymus bark in the British Pharm copoea is inadequate.—E. N. GATHERCOAL.

163. **Youngken, H. W.,** Wafer ash as an adulterant for Euonymus. Amer. Jour. Pharm. 91: 160–165. 1918.—The two barks somewhat resemble each other but the fracture of wafer ash bark is short, the surface being pale yellow and waxy. The structure of each of the two barks is illustrated by microphotographs. The author was unable to note the bast fibers in Euonymus as described in the N. F.—A. HOGSTAD, JR.

164. **Zufall, C. J.,** The histology of Castela nicholsoni. Jour. Amer. Pharm. Assoc. **7**: 166–169. 1918.—This plant is a small shrub of the family Simarrubaceae, found in the West Indies and Mexico. In American medicine and pharmacy it is generally known as *Chaparro amargoso* and is used chiefly in the treatment of amebic dysentery. The macro- and microscopical structures are fully described and illustrated.—O. A. FARWELL.

165. **Sievers, A. F.,** Poisonous plants as sources of insecticides. Pharm. Era **51**: My. 1918.—The author discusses the effectiveness, availability and supply of poisonous plants as sources of insecticides. Insecticides should meet the following general requirements; (1) efficiency, (2) harmlessness towards the material on which it is used, (3) cheapness, (4) ease of application. Some well recognized plant insecticides, such as extract of tobacco leaves, quassia and insect flowers, are limited to a very small field or to a small class of insects. The qualifications which a plant must possess in order to make its use in the form of an insecticide practicable are (1) effectiveness, (2) technique necessary to make the material applicable, (3) availability and supply. Effectiveness is determined first by laboratory tests involving the action of the powder direct or in sprays upon insects, then in the form of water extracts with or without the application of heat. Field tests are finally made. Some organic solvent is generally necessary in extracting the toxic material, and the question of expense is important. Water will not, as a rule, redissolve toxic extracts obtained by the use of organic solvents. A method is suggested whereby the toxic substances are brought into very concentrated solution in some suitable organic solvent and this concentrate then mixed with a large quantity of water, the procedure resulting in a fine precipitation, which, by shaking can be held in suspension while being applied as a spray. Plant material otherwise satisfactory as an insecticide must be available in large quantities in order to be of practical importance. Leaves and branches are more desirable than roots, for the former are more convenient, less expensive to collect and may be procured without material injury to the plant. The size and duration of the plant should also be taken into consideration in choosing material for collection. The practicability of cultivating a plant for insecticidal use depends upon (*1*) extent of area suitable for growing it; (2) labor required; (3) margin of profit.—H. W. YOUNGKEN.

166. **Holm, T.,** Cissampelos pareira L. Merck's Rept. **27**: 7–9, 60–61. 1918.—This is a vine of the Menispermaceæ, widely dispersed in the tropics of both hemispheres. It is official in the Addendum of the British Pharmacopoeia as *cissampelos* in distinction from the root of *Chondrodendron tomentosum*, R. and P., which is also official as *pareira*. The use of the name *pareira* both as a specific name and as a pharmaceutical title, in addition to its local use as a vernacular name, has led to more or less confusion. Besides the two species mentioned

above there is a third of unknown origin (supposed to be a Menispermum) which produces drugs met with upon the American market under the name of *pareira brava*. Cissampelos has a long slender rhizome and very long roots. No macroscopical description of this drug is given, nor are characters pointed out by which it can be distinguished from the other closely related drugs, substitutes or adulterants. The distinguishing characters of the aerial parts and the histological structure of these, as well as of the drug, are fully described and figured. —O. A. FARWELL.

167. **Zörnig, H.**, Simaruba bark of commerce. Seperatabdruck aus den Verhandlungen der Schweizerischen Naturforschenden Gesellschaft 99. Jahresversammlung, (1917).—There are three commercial grades of Simaruba bark in the drug markets; (1) Orinoco bark; (2) Maracaibo bark; and (3) Guiana (Dutch) bark. The latter goes entirely to Holland and is the same as the Orinoco form, which comes through Ciudad, Bolivia and is *Simaruba amara*, Aublet (*S. officinalis*, D. C.) The Maracaibo bark is different from the Orinoco bark both macro- and microscopically and does not come from any species of the genus Simaruba. A comparison of this bark with that of species of various other genera proves it to be derived from some species of the genus Simaha.—O. A. FARWELL.

168. **van der Wielen, H.**, Pharmaceutical cinchona bark. De Indische Mercuur (through C. and D.); 90, 211. 1918.—Cinchona bark for pharmaceutical preparations should be valued, not on the quinine content alone, but on the total alkaloids, the nature of these and the kinds of acids present. *Cinchona succirubra* bark cultivated in Java has apparently deteriorated somewhat, but that from British India is less likely to have altered, and the total alkaloids from Indian succirubra bark have an especial antimalarial value. The proposal to utilize *Cinchona robusta* bark, of Java, in place of the *C. succirubra* bark should receive further careful consideration from the point of view of their relative therapeutic value and also as to the best method of making effective galenical preparations from them. Succirubra bark contains very little quinine but is rich in cinchonine and amorphous alkaloids while robusta bark is richer in quinine and especially so in cinchonidine.—E. N. GATHERCOAL.

169. **Youngken. H. W.**, Pharmacognosy of aloes. Pharm. Era. **51**: 119–120, 122. 1918.—Full descriptions of the species yielding the commercial varieties are given. The histology of the leaves of these species is said to be identical and is fully described; also the various methods employed in collecting the juice and in producing therefrom the commercial varieties of aloes, the individual characters of each being enumerated and methods for distinguishing one from another rather fully dwelt upon.—H. W. YOUNGKEN.

170. **[Anon.]**, Japanese insect flowers. Chem. and Druggist **90**: 231. 1918 [Editorial.]—The first plantations of insect-flowers were made in Japan in 1885 from seed of the genuine Dalmatian plant *Chrysanthemum cinerariaefolium*. Since the outbreak of the war, the industry in Japan has rapidly grown. The total exports in 1917 exceeded 30,000 cwt. The flowers are of the "open" or "half open" grade and are inferior to the former best Trieste grades—E. N. GATHERCOAL.

171. **Smith, H. G.**, Melaleuca resin. Chem. and Druggist **90**: 14. 1918.—The outer bark of *Melaleuca uncinata* contains 23 per cent of resin, which is orange-brown, semi-transparent, very brittle, readily soluble in alcohol, ether-alcohol and acetone, but slightly soluble in chloroform and benzene and insoluble in turpentine, even at boiling. The chief consistuent is resin acid, $C_{17}H_{26}O_4$, which melts at 148–150°C. and in alcoholic solution gives a deep-green color, precipitating with ferric chloride. A piece of the bark, ignited at one end will continue to burn like a candle until consumed.—E. N. GATHERCOAL.

172. **Phillips, E. P.**, Buchu production in south Africa. Chem. and Druggist **90**: 31–32. 1918.—The leaves of *Barosma betulina*, *B. crenulata*, *B. serratifolia* and other species of Barosma are considered. A discussion and comparison involving the botany of these leaves and their chemistry and medicinal uses; the manner of collecting and curing the leaves to form the drug buchu; adulterants, distillation and commercial distribution of the drug; exports and prices and a summary of the literature on the subject. Since the imposition, by the U. S. Government some years ago, of a tax on the gathered leaves the quantity exported

has markedly decreased (1912, 223,000 lbs.; 1916, 130,000 lbs.) and the price has increased (1909, 8 d. per lb.; 1916, 3 s. 3 d. per lb.). The advantage of cultivating the various species of *Barosma* yielding drug is presented, as also the collection of the leaves at the right season, the perfect curing of the drug, and the proper grading of consignments.—E. N. GATHERCOAL.

173. **[Anon]**, Quinine wanted in Siam. Chem. and Druggist **90**: 130. 1918. [Editorial].—Recorded deaths from fevers in Burma far exceed those from any other known cause, and malarial fever incapacitates many thousands for weeks and months. More than 10 million quinine tablets were made and sold in 1916 by the Burmese government; but recently the supply of quinine has become limited, new dies for the tablet machines are hard to obtain and even cartridge paper for wrapping the packages is unobtainable from India, so that the demand far outruns the supply. In addition, speculators buying government quinine and selling at great profit across the border in Siam have been reported. The demand for Siam is insistent and might profitably be met from Great Britain after the war is over.—E. N. GATHERCOAL.

174. **Pool, R. J.**, A chart on general plant histology and physiology. Trans. Amer. Microsc. Soc. **37**: 53–58. *Pl. 6.* 1918.—Emphasizes the use of a chart to express graphically to beginners some interrelations between histology and physiology.—DUGGAR. (St. Louis).

PHYSIOLOGY

B. M. DUGGAR, *Editor*

175. **Blackman, V. H., and S. C. Paine**, Studies in the permeability of the pulvinus of Mimosa pudica. Ann. Bot. **32**: 69–85. *Fig. 1–5.* 1918.—An excised pulvinus of *Mimosa pudica* immersed in warm water with the internal tissues exposed contracts on stimulation, indicating that the loss of turgor cannot be explained by a sudden increase of permeability of the tissues allowing a rapid exosmosis. The exosmosis of electrolytes was studied by the change of the electrical conductivity of the immersion water in a specially constructed conductivity cell, showing that contraction is associated with increased exosmosis. This increase is too small to account for the sudden loss of turgor, which is probably due to the disappearance or inactivation of a considerale part of the osmotic substances of the cells.—Experiments show that since the conductivity method is direct it is superior to the indirect plasmolytic method for the study of the effect of light on permeability. By use of the former it was shown that in the pulvinus the permeability of the cells for electrolytes is increased by exposure to light, but the stimulation rapidly decreases with time. A sudden change from light to darkness also increases permeability. Independent contractions of the pulvinus occurred at gradually decreasing intervals, so that, the time for the recovery becoming less and less, the contractions also decrease in extent, and the pulvinus at the end of the series remained in the contracted state.

Below 50°C. a slow rise of temperature has little effect on the rate of exosmosis. At higher temperatures increased permeability is probably due to lethal changes.—ZELLER (St. Louis).

176. **McCall, A. G., and P. E. Richards**, Mineral food requirements of the wheat plant at different stages of its development. Jour. Amer. Soc. Agron. **10**: 127–134. *Pl. 2–3; fig. 22–23.* 1918.—Three stages in the development of the wheat plant are considered and thirty-six proportions of mono-potassium phosphate, calcium nitrate, and magnesium sulphate were used, in washed quartz sand in culture pots arranged on rotating tables with special irrigating devices. The results indicate that the most favorable proportions remain constant for the first two growth periods, each of thirty days; but for the final growth period—from 60 days old to maturity—the favorable proportions are materially changed. A relatively lower magnesium ratio is required at first.—DUGGAR (St. Louis).

177. **Winslow, C. E. A., and I. S. Falk**, Studies on salt action. I. Effects of calcium and sodium salts upon the viability of the colon bacillus in water. Proc. Soc. Exp. Biol. and Med. **15**: 67–69. 1918.—A study of the viability curve, the results of which indicate that for

this bacillus the effects of these salts and their antagonistic influence yield data analogous to those obtained with higher organisms.—DUGGAR (St. Louis).

178. **Wolkoff, M. I.,** Effect of ammonium sulfate in nutrient solution on the growth of soy beans in sand cultures. Soil Science 5: 123–150. *Fig. 1–7.* 1918.—Substituting ammonium sulfate for potassium nitrate in Tottingham's nutrient solution it was found that the former gave increased growth up to a certain limiting concentration. Growth in these experiments was measured by several criteria.—DUGGAR (St. Louis).

179. **Hills, T. L.,** Influence of nitrates on nitrogen-assimilating bacteria. Jour. Agric. Res. 12: 183–230. 1918.—This paper considers the effects of nitrates on the growth of Azotobacter and their relation to pigment production and to the formation of volutin bodies; likewise the effects on the growth of *Bacillus radicicola* in culture, and as influencing nodule development. The usual technique was followed and in general the results indicate that, while the growth of both organisms is promoted by nitrates in low concentration, Azotobacter responded more markedly to their presence and is more resistant to higher concentration. At the same time pigmentation of Azotobacter increases with concentration of the nitrate. Large amounts of any nutrient nitrate tested proved detrimental to the formation of nodules on alfalfa.—DUGGAR (St. Louis).

180. **Burling, H. A., and M. Levine,** Concentration of glucose and lactose and viability of coli-like bacteria. Amer. Jour. Publ. Health 8: 306–307. 1918.—Adding 0.5 per cent glucose to a medium consisting of 0.5 per cent peptone and 0.5 per cent di-potassium phosphate in distilled water, *Bacillus coli*-like organisms multiply rapidly during the first ten hours, but within 48–96 hours die off rapidly; whereas *B. aerogenes* and *B. cloacae* persist in undiminished numbers. Glucose of 0.3 per cent concentration is not injurious to *B. coli* in the same interval, while 1 per cent induces more rapid death. Lactose gives practically analogous results. The results show the necessity of reducing the concentration of lactose in prelimiary enrichment media. An explanation may perhaps relate the phenomenon to change in hydrogen-ion concentration.—DUGGAR (St. Louis).

Kidd, F., Translocation in plant tissues. New Phytol. 17: 44–45. 1918.—The author questions the validity of the physical chemical concepts of Mangham in a paper on this subject (Ann. Bot. 31: 293–311. 1917).—DUGGAR (St. Louis).

181. **Long, W. H., and R. M. Harsch,** Pure cultures of wood-rotting fungi on artificial media. Jour. Agric. Res. 12: 33–82. 1918.—Many physiological cultural characters were studied by means of pure cultures of various wood-rotting fungi grown on agar prepared with vegetable decoctions derived from ten different sources. Extensive tables are given showing the influence of the substrate, of sunlight, and of other conditions on vegetative characters; likewise the effects of a variety of conditions on the character of sporophore formation; and throughout the whole there has been kept in mind various criteria which might be of value in the differentiation of the species and strains of organisms employed.—DUGGAR (St. Louis).

182. **Bioletti, F. T., W. V. Cruess, and H. Davi,** Changes in the chemical composition of grapes during ripening. Univ. California Publ., Agric. Sci. 3: 103–130. *Fig. 1–11.* 1918.—The composition of grapes was studied both during the period of growth and of ripening, and determinations were made of total solids and sugar, total and free acid, potassium tartrate (cream of tartar), and protein. While total sugar follows closely the total solids curve during ripening, the total and free acid decrease rapidly during ripening. In the early stages of growth, however, acidity increases due to an increase of free acid.—DUGGAR (St. Louis).

183. **Dox, A. W.,** Amino acids and micro-organisms. Iowa Acad. Sci., Proc. 24: 539–545. 1917. [Distributed, 1918.]—Collates the decomposition of amino acids as effected by yeasts and bacteria.—DUGGAR (St. Louis).

184. **Hasselbring, H.,** Behavior of sweet potatoes in the ground. Jour. Agric. Res. 12: 9–17. 1918.—An investigation showing changes in water, sugar, and starch content of sweet potatoes during the latter part of the growing season whereby it appears that there is increased

water content practically coincident with the destruction of the leaves, whereas a constant total carbohydrate content is maintained, although there is a gradually decreasing starch and increasing cane sugar content during the latest stages examined—as under storage conditions, previously reported.—DUGGAR (St. Louis).

185. **Allen, P. W.,** A simple method for the classification of bacteria as to diastase formation. Jour. Bact. 3: 15–17. 1918.—To standard agar is added 0.2 per cent of water soluble starch. After sterilization in the autoclave, Petri dishes are poured, hardened, and a streak inoculation with the organism is made. After a special incubation treatment, the culture is flooded with alcoholic iodine to determine if starch hydrolysis has occurred.—DUGGAR (St. Louis).

186. **Corper, H. J., and H. C. Sweany,** The enzymes of the tubercle bacillus. Jour. Bact. 3: 129–151. 1918.—Employing to some extent new methods, the authors report autolytic enzymes for both the human and bovine varieties of the tubercle bacillus. The bacilli or autolyzates possess trypsin-like, erepsin-like and pepsin-like enzymes, also a nuclease and urease, but they do not possess carbohydrate enzymes, so far as investigated, nor enzymes capable of digesting certain elastic tissues.—DUGGAR (St. Louis).

187. **Falk, I. S., and C. E. A. Winslow,** The effect of potassium bromate upon enzyme action. Jour. Biol. Chem. 23: 453–462. 1918.—It is found that potassium bromate, in concentrations of one part in 100,000–200,000, consistently stimulates the digestion of casein by trypsin *in vitro*. The casein-trypsin solutions were made by adding definite amounts of these substances to a mixture of dibasic and monobasic potassium phosphates with a P_h value 7.1. Considerably higher concentrations of the bromate are slightly inhibitive. A slight stimulative action of the bromate on the digestion of casein by pancreatin was also found.—DUGGAR (St. Louis).

188. **Long, E. R.,** Further results on desiccation and respiration of Echinocactus. Bot. Gaz. 655: 354–358. *Fig. 1.* 1918.—An Echinocactus loaded with carbohydrate through desiccation for eight months in the open was placed in a dark chamber in order to follow catabolic changes and water balance. As anticipated, water was lost more uniformly in the dark chamber, but after 22.5 months one plant had lost 57 per cent of its original weight, 12 per cent while in darkness. Under the last mentioned condition soluble sugars disappear rapidly this disappearance being accompanied by the development of high acidity. At this stage the destruction of polysaccharids had scarcely begun, and the total hydrolizable carbohydrate was hardly less than normal. Destruction of the latter does occur after confinement without photosynthesis for years, and this breaking up of stable substance in conjunction with resistance to desiccation explains the great viability of this plant in spite of prolonged starvation.—DUGGAR (St. Louis).

189. **Child, C. M.,** Physiological senescence in Hydromedusae. Marine Biol. Bull. 34: 49–63. 1918.—In consideration of much recent work on plants as well as animals the author's findings are important in showing that with advancing development there are correlated certain progressive changes in behaviour and susceptibility, indicating a change of physiological state. It is concluded that a decrease in the rate of oxidation is a characteristic of these forms as well as of other animals previously studied.—DUGGAR (St. Louis).

190. **Gerecke, W. F.,** Effects of rest and no-rest period upon growth of Solanum. Bot. Gaz. 65: 344–353. 1918.—Among the differences noted in the growth from the two series of potato tubers are these, (1) that the no-rest tubers produced one-stalked plants, (2) that these plants had a longer growing period than those from tubers given a normal rest, and (3) that recovered tubers of the no-rest series which were planted a second time exhibit a germination of several buds, these appearing above ground in about the same period as those from normal rest-period tubers.—DUGGAR (St. Louis).

191. **Hodgson, R. W.,** An account of the mode of foliar abscission in citrus. Univ. California Publ., Bot. 6:, 417–428. *Fig. 1–3.* 1918.—The mode of abscission conforms to the usual type. With regard to physiological phenomena, there is a well defined swelling and gelatini-

zation of the cell wall followed by dissolution through hydrolysis, all cells in the zone of abscission exhibiting swelling and gelatinization, but resuming cell division after separation, thus leading to the formation of clusters of clavate cells held by a portion of the gelatinized wall. Starch is stored in the abscission zone and later used in growth.—DUGGAR (St. Louis).

192. **Le Goc, M. J.,** Effect of foreign pollination on Cycas Rumphii. Ann. Roy Bot. Gard. Peradeniya 6: 187-194. *Pl. 19.* 1917.—Indications are given to the effect that, under the influence of germinating pollen from related genera, the ovules of *Cycas Rumphii* are stimulated to grow to normal size, but as they contain no embryos no true fertilization can have occurred. —DUGGAR (St. Louis).

193. **Rigg, G. B.,** Growth of trees in sphagnum. Bot. Gaz. 65: 359–362. 1918.—Data have been accumulated in the Puget Sound and Alaska regions showing that various species of conifers exhibit a rate of growth in sphagnum which is only from 33 to 64 per cent of the rate in other habitats of the same region. No deciduous plants of the dimension of trees are found in sphagnum in that locality. Toxicity of the substratum is considered a chief factor in the inhibition of growth.—DUGGAR (St. Louis).

194. **Sasscer, E. R., and A. D. Borden,** Fumigation of ordinary greenhouse plants with hydrocyanic acid gas. U. S. Dept. Agric., Farmers' Bul. 880: 1–20. *Fig. 1–4.* 1918.—Gives extensive tables, showing resistance of host plants, as well as insect pests, to the gas.—DUGGAR (St. Louis).

195. **Teague, O.,** The toxicity of Victoria blue 4-R for *Bacillus paratyphosus* A, *B. paratyphosus* B, and *B. enteritidis.* Jour. Bact. 3: 1–6. 1918.—*Bacillus paratyphosus* B exhibits differential sensitiveness to the toxicity of the dye mentioned.—DUGGAR (St. Louis).

196. **Jörgensen, I., and W. Stiles,** The electroculture of crops. Sci. Prog. 12: 609–621. 1918.—This is a very general review of the literature on this subject which reveals an ever-recurring cycle of experiments having as their object the proof or disproof that the electric discharge has a beneficial effect on vegetation, and which shows that the method of inquiry is fundamentally wrong due to a neglect of quantitative measurements of the discharge and a lack of knowledge of plant physiology. The advances made thus far have come from the physicist, but there is now a sounder outlook for this field through researches by those familiar with the physiology of plants.—ZELLER (St. Louis).

197. **Shelford, V. E.,** Physiological problems in the life histories of animals with particular reference to their seasonal occurrence. Amer. Nat. 52: 129–154. 1918.—Although strictly an animal problem the data accumulated are of interest to the plant physiologist on account of the experimental work establishing the relation of seasonal variations to changing factors of the environment. In general the results indicate that explanations of variations are related to the sum of factor changes.—DUGGAR (St. Louis).

198. **Weston, W. H.,** The development of Thraustotheca, a peculiar water-mould. Ann. Bot. 32: 155–173. *Pl. 4–5; fig. 1–2.* 1918.—A morphological paper indicating certain physiological aspects of reproduction such as (1) the influence of environment on the germination of sporangiospores and on gemmae formation, which represent merely a transient resting state induced by unfavorable environmental conditions, and (2) the influence of nutrition on the type of development from oospores.—ZELLER (St. Louis).

199. **Bancroft, W. D.,** Outline of colloid chemistry. I–III. Jour. Franklin Inst. 185: 29–57, 199–230, 373–387. 1918.—A series of physical-chemical papers, fundamental in character, dealing with adsorption phenomena, catalytic action and the preparation of colloidal solutions.—DUGGAR (St. Louis).

TAXONOMY OF NON-VASCULAR CRYPTOGAMS

J. R. Schramm, *Editor*

200. **MacCaughey, V.,** Algae of the Hawaiian Archipelago. Bot. Gaz. **65:** 42–57, 121–149. 1918.—The results of extended studies on the algal flora of the Hawaiian Islands, covering a period of ten years and extending to all the larger islands of the Archipelago, are given in the present paper. In part I, the author gives a brief review of previously published work, and then presents the results of his studies on certain ecological aspects of the subject. Particular attention is given to the relatively rich flora of the coral reefs on the islands of Kauai and Oahu, on the typical fringing types of which the author recognizes five distinct zones or areas of plant and animal life; characteristic species of the zones are given in nearly all cases. Rockweeds, kelps, and laminarias, so conspicuous on colder coasts, are notably absent from the Hawaiian flora. Of particular interest are the coralline, or lime-secreting, algae on the reefs, especially abundant among these being representatives of Lithothamnion, Corallina, and Mastophora. The author reports the coralline forms from shallow waters as well as from waters of considerable depths, and regards them as undoubtedly contributing in a large degree to reef building. In the fresh water forms, particular attention is given to irrigated regions, ditches and flumes, mouths of volcanic caves, mountain streams, hot springs and thermal waters, summit bogs, and coastal brackish waters; representative species are listed for most of these habitats. No studies were made on the phytoplankton.

In striking contrast with the terrestrial flora, the algal flora of the islands, so far as the author can judge in the present incomplete state of knowledge, contains few endemic species, most of the forms being cosmopolitan or at least widely distributed in the tropics and subtropics. A list of probable endemic species is given. In part II the author lists practically all known species of Hawaiian algae, the list being based on his own observations as well as upon all available published records. Brief characterizations of the forms are given, as well as notes on distribution, habitat, and economic uses. *No new species are described.*—Schramm.

201. **White, J. W.,** Notes supplemental to the flora of Bristol. Jour. Bot. **56:** 77–87. 1918. —Four species of *Nitella* and *Chara* are listed.—Schramm.

202. **Howe, R. H.,** A further note on the lichens of Nantucket. Rhodora **20:** 40. 1918.

203. **Harper, E. T.,** Two remarkable Discomycetes. Bull. Torr. Bot. Club **45:** 77–86. *Pl. 1–3.* 1918.—*Underwoodia columnaris* Peck, described by Peck as stemless and everywhere acigerous, and placed by Schroeter in the family Rhizinaceae, was collected several times by the author in Michigan. The specimens show the presence of a short stem, and, furthermore, naked strips extending upward for short distances into the hymenium. The author has rewritten Peck's description to include the newly-found characters. The species is regarded as representing a monotypic genus showing no close affinities with any known discomycete. The author also gives critical notes on *Pustularia gigantea* Rehm.—Schramm.

204. **Ichimura, T.,** A new poisonous mushroom. Bot. Gaz. **65:** 109–110. *Fig. 1–3.* 1918.—A new species of Clitocybe, *C. acromelalga*, is described from a bamboo forest in Tsurugiji Noto, Japan.—Schramm.

205. **Stevens, F. L.,** Some meliolicolous parasites and commensals from Porto Rico. Bot. Gaz. **65:** 227–249. *Fig. 1–5, pl. 5–6.* 1918.—Two new genera of the Moniliales—Isthmospora and Grallomyces—are described with *I. spinosa* as the type species of the former and *G. portoricensis* as the type species of, the latter. In addition, there are described as parasitic on, or associated with, species of *Meliola*, the following new species: *Perisporium paulliniæ, P. meliolæ, Pseudonectria pipericola, Nectria meliolicola, N. portoricensis, Calonectria graminicola, Paranectria meliolicola, P. miconiæ, Næmosphæra hyptidicola, Coniothyrium glabroides, Acremonium meliola, Arthrobotryum dieffenbachiæ, A. glabroides, Helminthosporium glabroides, H. guareicolum, H. ocoteæ, H. melastomacearum, H. panici, H. parathesicolum, H. philodendri, H. kelleri, Isthmospora glabra,* and *Fusarium meliolicolum. Arthrobotryum penicillium* appears as a new combination. Notes on a number of described species of

meliolicolous parasites are given, together with an alphabetical list of the species of Meliol: and the fungi found upon them.—SCHRAMM.

206. **Zeller, S. M. and C. W. Dodge,** Rhizopogon in North America. Ann. Missouri Bot Gard. **5**: 1–36. *Pl. 1–3.* 1918.—The following new species of Rhizopogon are described fron North America: *R. maculatus, R. viridis, R. pannosus, R. diplophlœus, R. pachyphlœus, R. occidentalis.* *R. roseolus* appears as a new combination. Among the at present extra-limitec species. *R. angustisepta* and *R. rubro corticeus* are described as new. Among excludec species *Hydnangium aurantium* appears as a new combination. Critical notes on describec species are given, as well as a key to the North American species of the genus.—SCHRAMM.

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